The
Himalayan Gazetteer
or
The Himalayan Districts of the North Western Province of India

In 3 Vols. (6 Parts)

Edwin T Atkinson

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Part - 2

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PREFACE.

THE system of transliteration used in the present volume is that which has been adopted in the Gazetteer of the North-Western Provinces. For the vowels it is briefly as follows :—

a	as in	'woman.'	*u*	as in	'pull.'
á	,,	'father.'	*ú*	,,	'rule.'
e	,,	'grey.'	*ai*	,,	'aisle.'
i	,,	'bit.'	*o*	,,	'hole.'
í	,,	'machine."	*au*	as	'*ou*' in 'house' (nearly).

The original plan of this Memoir provided for a thorough examination of the country between the Tons and the Káli somewhat on the plan of Tennent's Ceylon, and in addition a less detailed summary of our knowledge of the Himálaya-Tibetan region. It was believed that only thus could the physical unity and with it the historical connections of the entire region be correctly understood. From or through the Himálaya came the pre-Aryan and Aryan races now inhabiting India, as well as the successive waves of Baktrian, Skythian, and Musalmán invaders who have conquered India in historical times. As we shall see hereafter, forms of belief having their origin in or beyond the Himálaya have influenced the religious systems of India from the earliest ages to the present day, so that for the political and religious history of the plains an adequate conception of the physiography, ethnography, and history of the Himálaya-Tibetan tract is a necessary preparation. It is to be regretted that this extended programme cannot be carried out, but the pressure of official duties prevents its completion, and all that can now be attempted is to work up the materials that have been collected for the Himálayan districts of the North-Western Provinces. At the end of Chapter I. will be found a series of 'References' to materials illustrating the history and resources of the Himálaya from Asám to Afghánistán. These were collected in continuation of a plan suggested by Mr. R. N. Cust in 1866 for the preparation of a 'Catalogue raisonné of every kind of printed information connected with the North-Western Provinces;' and I certainly know of no better aid to good administration than an index to the special and local reports of those engaged in it. The necessity for such a catalogue has ceased in great part wtih the publication of the District Memoirs, but there are subjects of general importance which the publication of the local accounts does not subserve. One of these is the history, using this word in its widest sense, of the Himálaya-Tibetan region, and I offer the references as the nucleus of a complete index to our knowledge of its physiography, products, peoples, and institutions.

As observed in the foot-note to Chapter I., much remains to be done, but at the same time very much more has been accomplished than is generally known. Scientific and economic botany have been carefully explored; the chapter on economic mineralogy leaves little to be desired: those on meteorology and geology have been brought up to the level of our present scientific knowledge; and the introduction to physical geography gives a popular and suggestive summary of the information that we possess, whilst the references afford a guide to materials for the study of details. All this is new, or embodies information buried in correspondence and reports, and practically as inaccessible to the public as if it had never been committed to writing. To General Richard Strachey I am indebted for the use of an unpublished work of his own on the physical geography of the Himálaya, which has been specially made use of in the chapters on 'Geology' and 'Meteorology.' Mr. H. B. Medlicott, Superintendent of the Geological Survey of India, prepared the chapter on 'Geology,' and Mr. S. A. Hill, Meteorological Reporter to the Government of the North-Western Provinces, contributed the valuable chapter on 'Meteorology.' Dr. King, Superintendent of the Royal Botanical Gardens, Calcutta, furnished the list of the *flora* of Western Garhwál, Dehra Dún, and Jaunsár-Báwar, and Dr. Watson, the list for Eastern Garhwál, Kumaon, and the Bhábar. To General Strachey I am further indebted for the list of plants collected by himself and Mr. Winterbottom in Kumaon, Garhwál, and the neighbouring parts of Tibet, and which has never before been published. This list has been admirably edited by Mr. F. Duthie, Superintendent of the Botanical Gardens at Sahâranpur, to whom also I am indebted for the sketch of the history of the Tea industry in the Himálayan districts. The sheets of the portions relating to economic botany have had the criticism of Dr. Watson and Mr. Duthie; and for the forest history Mr. Greig and Major Garstin have advised me in many matters of detail.

Of the maps, the map of Kumaon was prepared under the instructions of Colonel Walker, R.E., Superintendent of the Great Trigonometrical Survey, and is the result of great labour and care for detail: indeed, a less accurate map might possibly be more useful. The great 'one-inch to one-mile' sheets were photographed down to a smaller scale and sent to me. I then obtained the correct names in Hindi of all the villages, rivers, &c., in Kumaon and Garhwál (about 8,000) and entered against each the correct transliteration for use in a new edition of the large maps, and then drew up a draft list of names for the district map. I desired to enter the names of all halting-places on every ordinary route; villages in which the patwári usually resides; places of note; trade-centres; and all villages containing over one hundred inhabitants. After much trouble, correspondence, and inquiry, this was fairly accomplished. The villages retained were marked off on the photographic copies of the maps, and these were returned to the Surveyor-General with lists showing the actual and revised spelling for the further compilation. In addition, the principal lines of road have been laid down, and for the first time the pattis or subdivisions adopted at the recent settlement by Mr. J. Beckett have been shown. In the trans-Himálayan portion to which the survey had not extended I have added places from the village maps prepared by the patwáris, and in their selection was aided by Mr. Beckett. The map of the Himálaya-Tibetan region is taken from one prepared by Mr. Trelawny Saunders, omitting the eastern portion. The geological map is a revised copy of that which accompanied General Strachey's paper 'On part of the Himálaya Mountains and Tibet' read before the Geological Society in 1851. It may be necessary to explain that these volumes are not intended to be solely a popular account of the districts which they describe, but to contain, first of all, a record of all facts of permanent scientific or economic value that have been gathered by me during my visits to Kumaon and the Dehra Dún or which have been contributed by others. This work has occupied my leisure time for several years, and I can only hope that the labour and care bestowed on it will be of some use to my successors, and enable them to produce a more worthy record for those who are truly interested in the moral and material progress of the North-Western Provinces.

BOMBAY,
17*th December*, 1881.

E. T. ATKINSON.

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CHAPTER VIII.[1]

SCIENTIFIC BOTANY—(*continued*).

CONTENTS.

PLANTS found in Kumaon, Garhwál and the adjoining parts of Tibet by Captain (now General) Richard Strachey and Mr. Winterbottom.

THE following extract from Hooker and Thomson's "Introductory Essay[2] to the Flora Indica" regarding the value of General Strachey's and Mr. Winterbottom's botanical work in India appears to be a fitting introduction to the list of plants discovered by them in Kumaon, Garhwál, and in the neighbouring parts of Tibet.

"The collection distributed by Captain Strachey and Mr. Winterbottom consists chiefly of the plants of Kumaon and Garhwál, and of those of the adjacent parts of Tibet. Captain Richard Strachey was appointed by the Indian Government to make a scientific survey of the province of Kumaon, and was occupied on the task about two years, during which time, in addition to the important investigations in physical science which occupied his attention, he thoroughly explored the flora of the province, carefully noting the range of each species. He was joined by Mr. Winterbottom in 1848, and they travelled together in Tibet. Their joint collections, amounting to 2,000 species, were distributed, in 1852-53, to the Hookerian Herbarium, the British Museum, the Linnæan Society, and some foreign museums; and the scientific results are now in course of publication. The beautiful preservation of the specimens, and the fullness and accuracy with which they are ticketed, render this herbarium the most valuable for its size that has ever been distributed from India."

The original printed list was put into Mr. Duthie's hands by General Strachey in 1876, shortly before starting for India to take up his duties at the Saháranpur Botanical Gardens. Not having sufficient time to revise the whole of it by an examination of the specimens preserved in the Kew Herbarium, his notes were left behind to be completed by another hand. These notes together with the single copy of the original catalogue were missing for a time. The list however was found, and since then Mr. C B. Clarke has undertaken to revise it up to the end of the Polypetalæ, as well as the willows, the grasses, and the two families of *Urticaceæ* and *Piperaceæ*. After completing the revision of the polypetalous orders Mr. Clarke remarks, "I may add that the only use of the above verification must be to show how very good the names in the list are ; it would be useless to carry it on further, for in the next order (as *Compositæ)* it would be better to name up the Herbarium by the list than to reduce the list by the Herbarium. For unless the order has been specially worked up, as to the Indian plants in the Herbarium, it is not so carefully sorted out as were the Strachey and Winterbottom plants originally."

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[1] The materials for this Chapter were placed at my disposal by Major-General R. Strachey, and have been edited and arranged by Mr. F. Duthie, Curator of the Botanical Gardens, Saháranpur

[2] Page 65.

The following explanatory notes by the same botanist should also be recorded:—" In the above reduction all that is asserted is that I have seen the ticket of Strachey and Winterbottom copied on the left-hand side of the page, and that when I saw it, it was in the new bundle having the name on the right-hand side: nothing beyond this. As regards the missing tickets, it appears that some of the common plants (as *Nelumbium, &c.)*, were never laid in. Secondly, that where these were duplicates of the same plant under several numbers, some of the duplicate numbers were distributed. Thirdly, that some of the fragmentary or critical species were set aside and named in MS. on the sheets, no printed ticket being placed on the sheet, but the name being carried into the printed list. I only discovered this in the beginning of *Leguminosæ*, and have found several of the written-up sheets since. They are among the most important to find ; but without printed tickets they can hardly be found in a Herbarium of this size unless they are lighted on by a fortunate accident. Lastly, after these three causes have been allowed for, there are certain plants, as *Mucuna atropurpurea*, which I cannot find anywhere, though I have made a special and long search for them. I can only suppose that *Mucuna atropurpurea* was named on a flowering specimen or fragment that it was considered useless to paste down."

The arrangement of the revised list has been made to correspond with that of the Flora of British India, as far as that work has been completed; the names of many plants have consequently been altered in accordance with the nomenclature adopted in that work. As the reference number of each species in the original catalogue is given in column 2, the old name is not added except in the case of plants now referred to a different genus.

As the reference number of each species in the original catalogue is given in column 2, the old name is not added except in the case of plants now referred to a different genus.

ABBREVIATIONS USED IN THIS LIST.

IN COLUMN 3.

H.	for	herb	S. or Sh.	for	shrub.
H. cr.	,,	creeping herb	S. H.	,,	herbaceous shrub.
H. fl.	,,	floating herb	S. P.	,,	parasitical shrub
H. pr.	,,	prickly herb	S. sc.	,,	climbing shrub.
H. sc.	,,	climbing herb	S. T.	,,	arborescent shrub.

Herb S. & W. per herbarium of Strachey and Winterbottom.

IN COLUMN 5.

Bl.	for	blue	Or.	for	orange	Sc	for	scarlet.
Br.	,,	brown	Pk.	,,	pink	W		white,
Gr.	,,	green	Pr.	,,	purple	Y.		yellow.
Li.	,,	lilac	R.	,,	red.			

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
I.—RANUNCULACEÆ.						
1. Clematis.						
montana, *Ham.*	(7)	S. sc.	10′—12′	W.	April	Naini Tál, &c.,
var. *major*	(7½)	S. sc.	10′—30′	W.	May	Mádhári Pass, &c.
barbellata, *Edgew*	(5)	S. sc.	6′	Y. Pr.	May	Dwáli, Mádhári Pass.
grata, *Wall.*	(12)	S. sc.	10′	Y. Gr.	October	Almora, &c.
Gouriana, *Roxb.*	(9)	S. sc.	10′	Y. Gr.	December,	Kota-dún, Kapkot.
puberula, *Hf. & T.*	(14)	S. sc.	10′	Y. Gr.	March	Outer hills, Ukhimath.
orientalis, *L.*	...	...	...	...	...	...
var. *acutifolia*	(3 & 4)	S. sc.	2′—3′	Pr.	August	Milam, Níti Laptel, Guge.
nutans, *Royle*	(13)	S. sc.	10′	Y. Gr.	March	Outer hills, Ukhimath.
acuminata, *DC.*	(1)	S. sc.	6′—8′	...	July	Naini Tál, Binsar.
connata, *DC.*	(2 & 6)	S. sc.	6′—8′	W Y.	July-August.	Naini Tál, Rálam River, &c.
Buchananiana, *DC.*	11	S. sc.	10′	Y. Gr.	October	Almora, &c.
grewiæflora, *DC.*	10	S. sc.	8′	Y. Gr.	December,	Thal, &c.
2. Anemone.						
albana, *Ster.*	...	...	...	...	...	...
rupicola, *Camb.*	1	H.	9″	Wh.	June	Pindari, Rogila.
vitifolia, *Ham.*	8	H.	2′—3′	Wh	July	Naini Tál, &c.,
obtusiloba, *Don.*	4	H.	9″	Wh Bl.	June	Námik, Ramni,
var. *Govaniana*, *Wall*,	9	H.	3″—6″	Cr. Pr.	August	Bomprás, Rimkim.
rupestris, *Wall.*	...	...	...	...	...	...
rivularis, *Ham.*	3	H.	9″	Wh.	August	Rálam
var. *hispida*, *Wall.*	7	H.	1′	Wh.	May	Naini Tál
polyanthes, *Don.*	...	...	...	...	...	...
var. *villosa*, *Royle*	2	H.	1′—1½′	Wh.	May	Pindari, Rogila Rimkim.
narcissiflora, L.	...	...	...	...	...	...
tetrasepala, *Royle*	...	...	...	...	...	...
elongata, *Don.*	5	H.	1′—2′	Wh.	June	Chechani-khál,

Plants.

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Forest ...	5,5—7,500	R.	...	...	
Do. ...	8—10,000	R.	...	...	
Do. ...	8—10,000	R.	...	...	
Open bushes ...	4—6,500	R.	...	...	
Do. ...	2 5—3,500	R.	...	...	
Do. ...	3—4,500	R.	...	...	
...	...	...	...	...	
Open ...	11,500—15,000	...	D.	...	
Open bushes ...	3—4,500	R.	...	...	
Forest ...	7—8,000	R.	...	...	
Do. ...	7—9,000	R.	...	...	
Open bushes ...	3—6,500	R.	...	...	
Do. ...	4,500	R.	...	...	
...	...	...	...	...	Herb. Winterb., Nos. 737, 770.
Rocks ...	10,500—11,000	R.	...	...	
Woods ...	5—7,500	R.	...	...	
Open ...	8—9,000	R.	...	...	
	13—15,000	...	...	T.	
...	...	...	...	...	Herb. Winterb., No 136.
Do. ...	12,000	R.	...	...	
Do. ...	7—11,000	R.	D.	...	
...	...	...	...	...	
Do. ...	10,500—14,000	R.	D.	T.	
...	...	...	...	...	= *A. polyanthes* of Herb. Winterb.
...	...	...	...	...	Herb. Winterb.
Woods ...	10,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Habit of plant.	Colour of flower.	Time of flowering.	Locality.
3. Thalictrum.						
elegans, *Wall.* ...	3	H.	1′	...	June ...	Fálam River ...
platycarpum, *Hf. & T.*	4 & 13	H.	½′ to 2′	...	July ..	Milam ..
reniforme, *Wall.* ..	10	H.	4′	...	June ..	Rálam River ...
pauciflorum, *Royle* ...	5	H.	2′	...	July ...	Piti & Gori Rivers.
pedunculatum, *Edgew.*,	..	...	...	...	...	..
alpinum, *L.* ...		..	..	...	...	...
var. *acaule* ...	2	H.	3″—4″	...	July ...	Pindar, Hoti, Gugé,
„ *microphyllum*...	1	H.	3″—4″	...	August ...	Barjikáng Pass, &c.
Punduanum, *Wall.* ...	9	H.	1′—2′	Wh.	July ...	Naini Tál, &c.,
saniculæforme, *D. C.*,	7	H.	1′	Wh	July ..	Naini Tál, &c.,
javanicum, *Bl.* ...	8	H.	2′—4′	Wh.	May ...	Dwáli ..
foliolosum, *D C.* ...	11	H.	4′	W. Pr.	July ...	Naini Tál, &c.,
minus, *L.* ...	12	H.	2′—3′	...	August ...	Níti, Laptel ...
4. Callianthemum.						
cachemirianum, *Camb*,	1	H.	2″	Y. Pk.	June ...	Pindari, Bomprás.
5. Adonis.						
chrysocyathus, *Hf. & T*	...	H	9″	Y.	July ...	Rájhoti ...
6. Ranunculus						
aquatilis, *L.* ...	1	H. fl.	1′—2′	Y. Wh.	August ...	Burphu, Gyánima.
Cymbalariæ, *Pursh* ...	23	H. cr.	1″	Y.	September,	Gugé Valleys,
pulchellus, *C A. Mey.*,	18	H.	1½″	Y.	August ...	Bomprás, Niti Pass.
var. ...	19	H.	6″—9″	Y.	September,	Shángcha. &c.,
lobatus, *Jacq* ...	3 & 20	H.	2″—3″	Y.	September,	Burphu, Gugé,
hyperboreus. *Rottb.* ...	...	..	..	.	...	...
var. *natans* ..	22	H.	3″	Y.	September,	Topidhunga ...
„ *radicans* ...	21	H. cr.	3′	Y.	September,	Topidhunga ...
Chærophyllos, *L.* ...	..	..	...	...	...	...
affinis, *Br.* ..	16	H.	6″—12″	Y.	June ...	Kulhára ..
hirtellus, *Royle* ...	4	H.	6″	Y.	August ...	Barjikáng Pass,

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea	Himalaya. Rainy.	Himalaya. Dry.	Tibet.	Remarks.
Open ...	11,000	R.	.	...	
Do ..	11,500		D.	..	
Woods ..	8—10,000	R	. .	.	= *Thalictrum No* 10, in **Herb. S. & W.**
On rocks ...	7,500	R.	...	..	
...	..	..	..	.	Herb Winterb. No 53.
. .	..	...	...	.	
Open ...	12,500—15,000	R.	D.	T	= *T. alpinum*. & No. 793, **Herb.** Winterb.
Do. ...	11- 15,000	R.	.	...	
Banks	4—8,000	R.	.	. .	
On trees	7- 8,000	R.	..	...	
Woods	8,000	R.	.	.	
Open	3—7,000	R.		..	
Do ..	9—15,000	...	D.	T.	
Do. .	12,500—14,500	R.	D	...	
Wet, open .	15,500			T	= [illegible] and *Trollius* **No. 2** in Herb. S. & W.
Ponds ...	11,500—15,500	.	D.	T.	
Near water	14—15,000			T.	
Open .	14—17,000	.	D	T.	
In water	14 - 15,000	.		T.	
Open	11,500—15,000	. .	D.	T.	
...	.	.	.	..	
Do.	14—15,000	...		T	
Do.	14—15,000	.	.	T.	
...	..	..		. .	Herb. Winterb. 726.
Do.	11,000	.	..	...	
Do.	14,700	R.	.	.	

List of Kumaon.

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
hirtellus *var.* ..	5	H.	1"—1½"	Y.	June	Pathára ...
" .	6	H.	4"—6"	Y.	June	Láhur
" .	8 & 9	H.	2"	Y.	June .	[illegible], Pindari Valley.
" ...	16	H.	3"—4"	Y.	August .	Domprás ..
" .	17	H.	4"	Y.	August .	Dompras .
sceleratus, *L.* .	13	H.	2'	Y.	February,	Plains, Almora,
diffusus, *DC.* .	.	...	...	.	.	. .
var. *mollis* ..	10	H.	3—6'	Y.	June ...	Láhur, Cham Pass.
" *obtusus*	11	H.	1' 2'	Y.	June .	Jágesar, &c.
lætus, *Wall.* ...	12	H.	2'—3'	Y.	February,	Common ..
[illegible], *Hf. & T.*,	2	H.	½'—1'	Y.	May .	Láhur . .
arvensis, *L.* ...	14	H.	1'—1½	Y.	February,	Almora, &c. ..
7. Oxygraphis.						
glacialis, *Bunge* ...	1	H.	3"	Y.	July ..	Barjikáng Pass.
polypetala, *Hf. & T.*,	2	H.	3'	Y.	May ..	Champwa, &c.
8. Caltha.						
palustris, *L.* .	..	.	...	.	...	. .
var. *Govaniana* ..	1	H.	9—15"	Y.	May .	Mádhári Pass,
" *Himalensis* ..	2	H.	2'—3'	Y.	May .	Jhuni .
9. Trollius.						
acaulis, *Lindl.* ...	1	H.	6'	Y.	June ..	Pindari, Kulhara.
pumilus, *Don.* ...	2	H.	1'—2'	Y.	August ..	Barjikáng Pass.
10. Isopyrum.						
grandiflorum, *Fisch.*,	2	H.	3"—6'	Bl. Or.	July ..	Niti, Topidhunga.
var. *microphyllum*	1	H.	3"—6"	Bl. Or.	June ..	Pindári, &c. ..
11. Aquilegia.						
vulgaris, *L.* ...	...	...	...	...	...	...
var. *pubiflora* ...	2	H.	1'—2'	Pr.	July ...	Naini Tál ...
" *pyrenaica* ...	1	H.	2'	Pr.	June ...	Pathakori ...

Plants—(continued).

Conditions of soil. &c.	Elevation in feet above the sea.	Himálaya.		Tibet	Remarks.
		Rainy.	Dry.		
Open ..	10,000	R.	.	..	
Wet .	[illegible]	R.	...	.	
Open ..	11,000	R.	...		
Do. ..	11,500	R.	..	.	
Do .	1[illegible]	R.	.	..	
Fields ..	1—1,500	R	.	.	
...	..		.		
Open ...	7,500 - 10,000	R.	..	...	
Do. ...	6 – 9,000	R	..	...	
Do. ..	3 – [illegible],000	R.	..	...	
Wet	10,000	R.	.	..	
Fields .	[illegible],000	R	.	...	
Open .	1[illegible]	R	.	...	
Do. ..	12,000	R	..	...	*Callianthemum* No. 2 in Herb. S. and W.
...		.	..	...	
Wet, open ..	[illegible]	R.	...	..	
Do. .	[illegible]	R	...	...	
Open ...	11—12,000	R.	..	...	
Do. ...	13,000	R.	.	...	
On rocks ...	11,500—15,500	..	D.	T.	
Do. ...	11—13,000	R.	...	...	
...	...	...	...	...	
Woods ...	7,500	R.	...	...	
Open ..	10,500	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
12. Delphinium.						
denudatum, *Wall.* ...	8	H.	2'—5'	Bl.	June ...	Naini Tál, &c.,
cæruleum, *Jacq.* ...	10 13	H.	3'—2' 2'—3'	Bl.	August ..	Laptel, Niti, Gugé.
elatum, *Wall.*	...	.	...	.	...	...
var. *ranunculifolium*...	2	H.	3'	Pr.	August ...	Rálam River ...
vestitum, *Wall.* ..	7	H.	1'	Gy.	August ...	Tola ...
cashmirianum, *Wall.*,	5	H.	1'	Gy.	August ...	BarjikángPass,
var.	6	H.	2'	Bl.	September,	Pindari ...
Brunonianum, *Royl.*	4	H.	2'	Bl.	August ...	BarjikángPass,
13. Aconitum.						
Lycoctonum, *L.* ..	4	H	3'	Bl.	May ..	Mádhári Pass,
ferox, *Wall.* ...	3	H.	3'—4'	Bl.	August ..	BarjikángPass, Pindári.
Napellus, *L.* ...	5	H.	6"—8"	Bl.	August ..	BarjikángPass,
var. *multifidum* ...	2	H.	6"—12"	Bl.	September	Leptel, Milam.
heterophyllum, *Wall.*,	1	H.	2'	Bl.	July	Pindari, Milam,
14. Actæa.						
spicata, *L.*	...	H.	2'	Wh.	May ...	Kulhára ..
15. Pæonia.						
emodi, *Wall.* ...	...	H.	2'—3'	Wh.	May ..	Naini Tál, &c.
II.-MAGNOLIACEÆ.						
1. Michelia.						
Kisopa, *Ham.* ...	...	T.	50'	Wh.	May ...	Gágar ...
III.—MENISPERMACEÆ.						
1. Cocculus.						
laurifolius, *D. C* ...	1	T.	20'	Gr.	March ...	Outer hills, Almora.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Hima-laya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	5—7,500	R.	...	...	
Do. ..	12—15,500	...	D.	T.	
...	..	...	...	...	
Do. ...	9,500	R.	.	..	
Do. ...	11,500	..	D.	...	
Do. ...	12—15,000	R.	D.	...	
Do. ..	12,000	R.	..	...	
Do. ..	14,700	R.	...	...	
Near water in woods.	8—9,500	R.	...	...	
Open ..	12—13,500	R.	D.	...	
Do. ...	13,500	R.	...	...	
Do. ..	12,500—15,000	.	D.	T.	
Do. ...	12—13,000	R.	D.	...	
Shady woods ...	9—11,000	R.	...	...	
Woods ...	5—8,000	R.	...	...	
Forest ...	6—7,000	R.	..	...	
Open woods ...	1—5,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of plant.	Height of growth.	Colour of flower.	Time of flowering.	Locality.
2. Stephania.						
hernandifolia, *Walp.*,	3	H.sc.	...	...	...	?
elegans, *Hf. & T.*	2	H sc.	2′—3′	Pk.	June	Kathi, &c.,
rotunda, *L.*	1	H sc.	10′	Gr. Y.	May	Bágesar
3. Cissampelos.						
Pareira, *L.*	...	S.sc.	6′—8′	Gr. Y.	May	Almora, Bágesar
IV.—BERBERIDACEÆ.						
1. Holbællia.						
latifolia, *Wall.*	1	S sc.	15′	Pr.	April	Shámket, &c.,
var. *angustifolia*	9	S.sc	15′—20′	...	...	Binsar
2 Berberis.		.				
nepalensis, *Spreng.*	1	Sh.	6′	Y.	February,	Binsar, &c
vulgaris, *L.*	...		...	...	...	
var. *cretica*	11	Sh	5′	Y.	May	Pindari, Bampa
umbellata, *Wall.*	10	Sh.	10″	Y.	May	Dwáli
aristata, *D. C.*	2 & 5	Sh	8′—12′	Y.	April-May	Binsar, Naini Tál. Dudatoli.
var. *floribunda*	3,4 & 8	Sh.	10′—12′	Y.	May	Dwáli, Námik,
Lycium, *Royle*	7	Sh.	6′—10′	Y.	April	Razi, Nandáki River.
asiatica, *Roxb.*	6	Sh.	6′	Y.	April	Almora, &c.
concinna, *H. f.*	...	..	...	...	...	...
var.	9	Sh.	1½′	Y.	May	Razi
3. Podophyllum.						
emodi, *Wall.*	...	H.	1′—2′	W.	May	Pindari
V.—NYMPHÆACEÆ.						
1 Nelumbium.						
speciosum, *Willd.*	...	H.	...	W.	August	Bhím Tál

Plants—(continued).

Conditions of soil, &c	Elevation in feet above the sea.	*Himálaya.* Rainy.	*Himálaya.* Dry.	Tibet.	Remarks.
...	5,000?	R.	...	...	
Open ...	6—7,500	R.	...	..	
Forest ..	3,000	R.	...	...	
Open ...	3—6,000	R.	...	...	
Open woods ..	5—7,500	R.	...	...	
Forest ..	7,000	R.	...	...	
Woods ..	6—8,000	R.	...	...	
...	...	...	...	..	
Open ..	10—11,000	R.	D.	...	
Do. ..	9—10,000	R.	...	...	
Do. ..	6,500—10,000	R.	...	...	
Do. ..	8—10,000	R.	...	...	
Do. ...	3,5—9,500	R.	...	...	
Do. ...	2,5—7,500	R.	...	...	
...		.	...	...	
Woods ...	9,500	R.	...	...	
Open ..	10,500	R.	...	...	
In water ...	4—5,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
VI.—PAPAVERACEÆ.						
1. Papaver.						
dubium, *L.* ...	...	...	...	...	...	...
var. *lævigatum* ...	1	H.	1'—2'	R.	March ..	Almora ..
somniferum, *L.* ..	2	H.	1½'	W.	February,	Outer hills ...
2. Argemone.						
mexicana, *L.* ...	4	H.	2'	Y.	February,	Plains, Bhabar.
3. Meconopsis.						
aculeata, *Royle* ...	2	H.	1'—1½'	Bl.	July ..	Barjikáng, Niti,
robusta, *Hf. & T.* ..	1	H.	2'	...	August ...	Námik ..
4. Stylophorum.						
lactucoides, *Benth. & Hook.*	...	H.	9"	Y.	June ...	Rogila ..
VII.—FUMARIACEÆ.						
1. Dicentra.						
scandens, *Walp.*	...	H.	3'—4'	Y.	August ...	Jágesar below Binsar.
2. Corydalis.						
rutæfolia, *Sibth.* ..	7	H.	6"	Y.	June ...	Dwáli ..
cashmiriana, *Royle* ...	2	H.	3"	Bl.	May ..	Mádhári Pass,
elegans, *Wall.* ..	6	H.	9"	Y.	August ...	Barjikang Pass,
Goväniana, *Wall.* ..	3	H.	9"	Y.	May ..	Champwa ...
tibetica, *Hf. & T.* ...	16	H.	3"	Y.	August ...	Lanjar ..
Moorcroftiana, *Wall* ..	4	H.	1'—1½'	Y.	July	Rimkim ..
Gortschakovii, *Schrenk*	12	H.	1½'—2'	Y.	September,	Kyungar ..
ramosa, *Wall.* ...	9	H.	1'—1½'	Y.	July ...	...
var. *vaginans* ...	10	H.	1'—2'	Y.	August ...	Rálam, Niti ..
„ *nana* ...	13, 14, 17	H.	3"—4"	Y.	August,	Barjikáng Pass, Kala jawar ..
cornuta, *Royle* ...	8	H.	2'—3'	Y.	July ...	Chaur, Kálamandi Pass.
chærophylla, *DC.* ...	1	H.	1'—2'	Y.	June ...	Binsar ..
meifolia, *Wall.* ..	5	H.	1'—1½'	X.	...	?
flabellata, *Edgew.* ...	15	H.	2'—3'	Y.	August ...	Niti ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himá-yala.* Rainy.	*Himá-yala.* Dry.	Tibet.	Remarks.
...	...	...	...	...	
Fields ...	1—5,500	R.	...	...	
Cultivated ...	14,000	R.	...	...	
Open naturalized.	1,000	R.	...	...	
Open ...	11—12,500	R.	D.	...	
Do. ...	8,000	R.	...	...	
Do. ...	11,000	R.	...	...	= *Dicranostigma lactucoides.* in Herb. S. & W.
Shade ...	5—7,000	R.	...	...	
Woods ...	8,500	R.	...	...	
Open .	10—12,000	R.	...	...	
Do. ...	13,500	R.	...	...	
Do. ..	12,000	R.	...	.	
Do. ..	17,000	...	...	T.	
Do. ...	13,500—16,000	...	...	T.	
Do. ...	15,000	..	...	T.	
Do. ..	10,000 ?	R.	...	...	
Do. ..	11—12,000	R.	D.	...	
} Do. ..	14—15,000	R.	D.	...	
Woods ..	6—8,000	R.	...	...	
Rocks ..	7—8,000	R.	...	...	
Open ...	10,000?	R.	...	...	
Do. ...	9—11,500	...	D.	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
3. Fumaria.						
parviflora, *Lam.* ..	...	...	...	...	...	...
var. *Vaillantii* ..	...	H.	6"—12"	R.	January .	Plains, Almora,
VIII.—CRUCIFERÆ.						
1. Parrya.						
macrocarpa, *Br.* .	1	H.	..	...	August ...	Gugé
lanuginosa, *H. f. & T.*	2	H.	2"—3"	?	September,	Lanjar ..
2. Cheiranthus.						
himalayensis, *Camb.*...	...	H.	3"	Pr.	July ..	Unta-dhúra, &c.
3. Nasturtium.						
officinale *Br.* ..	2	H.	6"	Wh.	June ...	Almora, &c.
indicum, *DC.* ..	1	H.	1'—2'	?	March ..	Outer hills ...
4. Barbarea.						
vulgaris, *Br.* ...	...	H.	1'	Wh.	August ...	Kálam ...
5. Arabis						
glabra, *Crantz* ...	...	...	...	...	...	...
alpina, *L.* ...	14—15	H.	1'—2'	Wh.	August ...	Níti ...
amplexicaulis, *Edgew.*	1, 2 & 3	H.	6"—18"	W. Pk	May ..	Nádhári Pass,
6. Cardamine.						
hirsuta, *L.* ...	3 & 8	H.	1'	Wh.	March ...	Almora ...
impatiens, *L.* ...	9	H.	1'—2'	Wh.	March ..	Outer hills ..
macrophylla, *Willd.* var. *foliosa*	1, 2, & 4	H.	1'—3'	Pk. W. Y.	June-July,	Námik, Kulhára Sing-jari. Naini Tál ...
7. Alyssum						
canescens, *DC.* ...	...	H.	2"	...	July ...	Tisum ...
8. Draba.						
alpina, *L.* ...	2, 7	H.	1"	Y.	August ...	Kyungar, Barjikáng Pass.
incana, *L.* ..	8, 9	H.	2"—8"	Wh.	August ...	Níti, Gugé, Rimkim.
lasiophylla *Royle* ..	?	H.	1"—4"	Wh.	July ...	Milam, Gugé...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the area.	Himalaya. Rainy.	Himalaya. Dry.	Tibet.	Remarks.
...	...	..	...	. .	
Fields ..	1—5,500	R.	...	...	
Open ...	14—15,000	...	...	T.	
Do. ..	17,500	...	...	T.	
Do ..	16—17,000	...	D.	T.	
Water ..	—12,000	R.	...	..	
Open ..	1—6,000	R.	...	...	
Do. ..	6—12,000	R.	...	...	
...	...	...	..	...	= *Cruciferæ ignotæ* No. 10 in Herb. S. & W.
Open ..	11,500	...	D.	...	= *Cruciferæ ignotæ* Nos. 11 and 12 in Herb. S. & W.
Wet ..	8—10,000	R.	...	...	= *Cardamine* No. 5 in Herb. S. & W.
Open ...	5—6,000	R.	...	...	= *Cardamine* No. 6 in Herb. S. & W.
Do. ...	5—7,000	R.	...	..	
} Wet ...	6—10,000	R.	...	...	= *Arabis* No. 5 in Herb. S. & W.
Open ...	15,000	...	...	T.	= *Draba* No. 5 in Herb. S. & W.
Do. ...	14—16,000	R.	D.	T.	No. 2 in part Herb. S. & W.
Do. ...	11,500—15,500	...	D.	T.	
Do. ...	15—16,500	...	D.	T.	= No. 2 (partly) Herb. S. & W.

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
9. Cochlearia.						
scapiflora, *H. f. & T.*,	...	H.	2"	Wh.	August ...	Gugé ...
10. Sisymbrium.						
mollissimum, *C. A. Mey.*	3	H.	4"—8"	Pk.	July ..	Rimkim ...
himalaicum, *H. f. & T.*	7	H.	6"	Pk.	August ...	Milam ...
Thalianum, *Gay & Monn.*	8	H.	½'—1'	Wh.	March ..	Almora ...
rupestre, *Edgew.* ...	6	H.	1'—2'	Pk.	August ..	Pálam ...
strictum, *H. f. & T.* ...	5	H.	1'	...	July ..	Garhwál ..
Wallichii, *H. f. & T.* ...	9	H.	1'—2'	Pr.	March ...	Almora ...
Sophia, *L.* ..	2	H.	2'—3'	Y.	May ...	Almora ...
Columnæ, *Jacq.* ..	4	H.	2' 3'	...	July ..	Rimkim ..
Alliaria, *Scop.* ..	1	H.	2'	Wh.	May ...	Almora ..
11. Eutrema.						
primulæfolium, *H. f., & T.*	...	H.	4"—6"	Pr.	May ..	Mádhári Pass,
12. Erysimum.						
hieracifolium, *L.* ..	1	H.	1' 2'	Y.	July ..	Rimkim, Joshimáth.
Sp. ...	2	H.	1"	Y.	August	Gugé ..
13. Christolea						
crassifolia, *Camb.* ..	...	H.	1'	...	July ..	Sattag river in Gugé.
14. Braya.						
rosea, *Bunge* ..	...	H.	2"—4"	Wh.	July ...	Sagta-deo, Gugé.
15. Brassica						
nigra, *Koch.* ...	...	H	1'—3'	Y.	March ..	Almora, &c.
campestris, *L.* ..	...	H.	1'—3'	Y.	March ...	Almora, Milam,
juncea, *H. f. & T.* ...	...	H.	1'—3'	Y.	March ..	Almora, &c. ...
16. Eruca.						
sativa, *Lam.* ...	...	H.	1½'	Wh.	May ...	Almora, &c. ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	15,500	...	..	T.	
Do. ...	13,500	...		T.	= *Arabis* No. 10 Herb S. & W.
Do. ..	13,000	...	D.	..	= *Arabis* No 8 and *Crucif. ignot*, No. 14, Herb. S. & W.
Fields ..	5—6,000	R.	...	...	
Open ...	12,000	R.	...	...	= *Arabis* Nos. 7 & 9, Herb S. & W.
Do. ...	6—8,000	R.	...	...	= *Crucifer Ignot*. No. 5 Herb. S. & W.
Fields ..	5—6,000	R.	...	.	
Do ...	5—6,000	R.	...		
Open .	13,500		...	T.	= *Crucifer. Ignot*. No. 1 Herb. S. & W.
Fields ..	5—6,000	R.	..	...	
Rocks ..	9—10,000	R	..	.	= *Arabis* No. 6 in Herb. S. & W.
Open ..	6—14,000	R.	D.	T.	
Do. ..	15,500	..	...	T.	
Do. ..	13,500	...	..	T.	
Do. ..	10—16,500	R.	D.	T.	= *Draba* Nos. 3 & 13 Herb S. & W.
Cultivated ..	1—6,000	R.	...	...	= *Sinapis* No 5 Herb. S. & W.
Do. ...	5—11,000	R.	D.	...	= *Sinapis* Nos. 2, 3 and 6 Herb. S. & W.
Do. ..	1—6,000	R.	...	...	= *Sinapis* Nos. 1 and 4 Herb. S. and W.
Do. ...	1—6,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
17. Capsella						
Bursa-pastoris, *Mœnch.*	...	H.	1'–2'	Wh.	All the year.	Ubique ...
Thomsoni, *H. f.* ...	...	...		...	..	...
18. Lepidium.						
Sativum, *L.* ..	1	H.	1'			Almora ...
capitatum, *H. f. & T.*	2	H	4"	Wh.	August ..	Milam, Topidhunga.
19. Megacarpæa.						
polyandra *Benth.* ..	...	H.	5'–6'	Wh.	May ...	Champwa, Pindari.
20. Thlaspi.						
arvense, *L.* ..	3	H.	1"	Wh.	July ..	Almora ..
alpestre, *L.* ..	1, 2	H.	6"	Wh.	June ..	Rajhoti ...
21. Iberidella.						
Andersoni, *H. f. & T.*	...	H.	2"-4"	Wh.	July ...	Sagta-deo, Gugé.
22. Crambe.						
cordifola, *Stev.* ..	...	H.	4'–5'	Wh.	July ..	Rimkim ...
23. Raphanus.						
sativus, *L.* ..	...	H.	1'	...	March ..	Plains to Almora.
24. Chorispora.						
sabulosa, *Camb.* ..	...	H.	3"	...	July ...	Rimkim ...
IX.-CAPPARIDEÆ.						
1. Cleome.						
viscosa, *L.* ...	...	H.	3'—4'	Y.	August ..	Sarju river, outer hills.
2. Capparis.						
horrida, *L.* ..	...	Sh.	10'	W. Gr.	March ...	Bhábar ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	8—12,000	R.	...	..	
...	..	..	...	.	Herb. Strachey No. 15.
Fields ...	5- 6,000	R.	..	...	
Open ...	13—15,000	R.	D.	T.	
Do. ...	12,000	R.	...	...	= *Crucif. ignot.* No. 15 in Herb. S. and W.
Fields ...	5—6,000	R.	...	.	
Open ...	15,000	..	...	T.	
Open ...	10—16,500	R.	D.	T.	= *Draba* Nos. 3, 4, 11, 12, in Herb. S. and W.
Do. ...	14,000	...	...	T.	= *Crucif. ignot.* No. 4 in Herb. S. and W.
Cultivated ...	1—6,000	R.	...	...	
Open ..	18,500	...	...	T	
Do.	2—3,000	R.	...	...	= *Polanisia viscosa* in. Herb. S. and W.
Forest ...	1—2,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
X.—VIOLACEÆ.						
1. Viola.						
biflora, *L.*	1	H.	3"	Y.	May	Naini Tál, &c.,
Patrinii, *DC.*	3, 4, 10	H.	2"–5"	Bl.	March-July.	Outer hills, Bampa.
serpens, *Wall.*	5, 6, 7, 8, 9, 11.	H.	2"–6"	Bl W.	March-June.	Savangentha, Almora, Naini Tál, &c.,
kunawarensis, *Royle*,	2	H.	1"–2"	Bl.	July	Kyungar
XI.—BIXINEÆ.						
1. Flacourtia.						
Ramontchi, *L'Herit.*	...	...	...	...		...
var. *occidentalis*	...	T.	25'	...	February,	Bhábar
XII.—PITTOSPOREÆ.						
1. Pittosporum.						
floribundum, *W. & A.*,	1	T.	...	...	..	Bhábar
eriocarpum, *Royle*	2	T.	20'—30'	...	April	Outer hills
XIII.—POLYGALACEÆ.						
1. Polygala.						
triphylla, *Ham.*	1	H.	2"—3"	R.	August	Páton
var. glaucescens	2	H.	3"–4"	Y.	August	Ramari
crotalarioides, *Ham.*	7	H.	6"—12"	Pk.	May	Almora, &c.
abyssinica, *Fresen.*	6	H.	12"—15"	Pk.	April	Kapkot, outer hills.
persicariæfolia, *DC.*,	4	H.	6"	Pk.	July	Jágesar
chinensis, *L.*	3	H.	6"	Y. Gr.	July	Almora
sibirica, *L.*	5	H.	6"	Pk.	May	Kosi river
XIV.—CARYOPHYLLACEÆ.						
1. Gypsophila.						
cerastioides, *Don.*	1	H.	2"	Pk.	August	Námik, Rálam,
2. Saponaria.						
Vaccaria, *L.*	...	H.	2'—3'	Pk.	March	Outer hills

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himalaya. Rainy.	Himalaya. Dry.	Tibet.	Remarks.
Open wet ...	8—13,500	R	D.	...	
Banks, & rocks,	4—11,000	R.	D,	.	
Do. ...	3—11,000	R.	D.	...	
Open wet ...	15,500	...	..	T.	
...	...	...	...	...	
Forest ...	1—2,500	R	..	...	= *F. sapida*, in Herb. S. & W.
Forest ...	1—2,000	R.	...	...	
Open ...	4,000	R.	...	...	
Do. ...	6,000	R.	...	...	
Do. ...	4,500	R.	...	..	
Do. ...	4—7,000	R.	...	..	
Do. ...	2,5—4,000	R.	...	...	
Do. ..	6—6,500	R.	...	...	
Do. ...	4,000	R.	...	...	
Do. ...	6,000	R.	...	...	
...	8—12,000	R.	..	...	
Fields ...	1—4,000	R.	...	...	= *Vaccaria parviflora*, Mœnch & Silene No. 9 in Herb. S. & W.

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
3. Silene.						
inflata, *Sm.* ...	1	H.	1'—2'	Wh.	June ...	Outer hills, Milam, Niti.
conoidea. *L.*	2	H.	1'—2'	Pk.	March ...	Almora ..
Moorcroftiana. *Wall.*,	4. 10	H.	6"—9"	Pk.	August ..	Gothing, Rákas tál.
Falconeriana, *Benth.*,	5	H.	3'	Gr. Y.	July ..	Almora ..
Griffithii, *Boiss.* ..	7	H.	2'	Wh.	July ...	Bampa ..
Stracheyi, *Edgew* ..	8	H.	3'	Wh.	August ..	Piti river ..
4. Lychnis.						
apetala, *L* ...	4,6	H.	4"—7"	Wh.	July	Rálam, Gugé .
macrorhiza, *Royle* ..	3	H.	4"	Wh.	September,	Topidhunga, Llanjar
brachypetala, *Hort.* ..	5	H.	6"	Wh.	July ...	Laptel, Rálam,
indica, *Benth.* ..	...	...	...	...	...	...
var. *fimbriata* ..	1	H.	3'	W. Pr.	August ...	Piti river ..
pilosa, *Edgew.* ...	2	H.	1'—2'	Wh.	August, September.	Rálam, Tungnath.
5. Cerastium.						
vulgatum, *L.* ...	2	H.	4"	Wh.	May ..	Almora, &c. ..
Thomsoni, *Hook. f.*	1	H.	4"	Wh.	May ...	Mádhári valley,
6. Stellaria.						
paniculata, *Edgew.* ...	1, 2 & 3.	H.	1'—3'	Wh.	May. July, September,	Binsar, Shaidevi.
media, *L.* ...	7	H.	6"—12"	Wh.	All the year.	Outer hills, &c ,
semivestita, *Edgew.* ..	9	H.	1'	Wh.	May .	Chaur ..
Webbiana, *Wall.* .	...	H.	3"—4"	Wh.	March ..	Almora ..
latifolia, *Benth.* ...	...	H.	4"	Wh.	August ..	China, Naini Tál.
longissima, *Wall.* ..	5	H.	1'—2'	Wh.	May ...	Mádhári Pass, Naini Tál.
uliginosa, *L.* ..	8	H.	1"—6"	Wh.	March ..	Almora. Barjikáng Pass.
decumbens, *Edgew.* ...	6	H.	5"	Wh.	August ...	Milam, Rálam,

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Do.	5–11,500	R.	D.	. .	
Do.	5–6,000	R.	...		
Open	11–15,000	...	D.	T.	
Do.	4–6,000	R.	...	...	
Do.	11,000		D.	...	
near water	7,500	R.	...	...	= *Meliandrium pilosum* in Herb. S. and W.
Open	12–16,000	R.	D.	T.	
Do.	15–17,000	..	D.	T.	
Do.	12–14,500	R.	D.	...	= *Meliandruim pilosum* in Herb, S. & W.
...		..	...	..	
Do.	7–8,000	R.	...	...	
Rocks, open	9 12,000	R.		...	
Open	5–7,500	R.	..	...	
Do.	10,000	R.	..		
Woods	7–8,000	R.	...		
Do.	1–6,000	R.		...	
Wet	6,000	R.	...	...	
Open	4–6,000	R.	...	..	= *Leucostemma* No. 2 in Herb. S. and W.
Rocks	6 - 8,000	R.	...	..	= *Leucostemma* No. 1 in Herb, S. and W.
Open	6–9,000	R.	...	...	
Wet	4–13,000	R.	...	...	
Open	12–13,500	R.	D.	...	= *Arenaria* No. 9 in Herb. S. & W.

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
7. Arenaria.						
foliosa, *Royle* ...	...	H.	2"	Wh.	June ...	Jelam
festucoides, *Benth.* ..	2	H.	3"	Wh.	August .	Pindari, Karnáli river.
var. *imbricata* ...	3	H.	2"—3"	Wh.	Ditto ..	Bálam
musciformis, *Wall.* ...	1	H.	1"	Wh.	Ditto ..	Balchha Pass ..
serpyllifolia, *L.* ...	10	H.	4"	Wh.	Ditto ...	Jelam. Milam .
glandulifera, *Edgew.* ..	13	H.	1"	Wh.	Ditto ..	Barjikáng, Chorhoti Pass.
Stracheyi, *Edgew.* ...	...	...	...	...	...	...
holosteoides, *Edgew.* ..	...	H.	2"	...	September,	Rákas-Tál ...
8. Sagina.						
procumbens, *L* ...	...	...		...		..
var. *pentamera* ...	2	H.	1"—1½"	...	June ..	Jelam, Singjari.
9. Thylacospermum						
rupifragum, *Schrenk.*,	...	H.	1"—2"	Wh.	July ..	Gugé ...
10. Spergula						
pentandra, *L.* ...	...	H.	4"—6"	Wh.	...	Bhábar ...
11. Drymaria.						
cordata, *Willd.*	...	H. cr.	6"	...	February.	Kota Dún ...
12 Polycarpæa.						
corymbosa, *Lam.*	...	H.	6"—9"	Wh.	July ..	Almora ..
XIV*.—PORTULACEÆ.						
1. Portulaca.						
oleracea, *L.*	...	H.	6"	Y.	July ...	Do. ...

Plants—(continued).

Condition of soil, &c.	Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ..	9,000	...	D.	..	
Do. ..	10—16,500	R.	D.	T.	= *Alsine Roylei* in Herb. S. and W.
Do. ..	12,000	R.	...		
Do. ..	15—16,500	...		T.	
Do. ..	9—11,500		D.	..	
Do. ...	14—16,500	R.	D.	...	
...	...	.	...	...	
Do ..	15,000	..	...	...	= *Gypsophila* No. 3 in Herb. S. & W.
...	...	...	...	...	
Do. ..	9—10,000	R.	D.	...	
Do. ..	15—16,500	..	...	T.	
Do. ...	1—2,000	R.	...	...	
By water ...	2,000	R.	...	...	
In fields ...	5,500	R.	...	...	
Do. ..	5,500	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
XV.—TAMARISCINEÆ.						
1. **Tamarisc.**						
dioica, *Roxb.*	...	Sh.	6′ – 10′	...	...	Kosi and Ganges rivers.
2. **Myricaria.**						
elegans, *Royle.*	1	Sh.	6′	Wh. Pk	June ..	Níti, Satlaj river in Gugé.
germanica, *Desv.*	2	Sh.	3′	Wh. Pk	June ..	Pindari, Milam, Tisum.
XV*.—HYPERICINEÆ.						
1. **Hypericum**						
cernuum, *Roxb* ...	6	Sh.	4′—6′	Y.	February,	Almora, &c. ...
cordifolium, *Chois.* ...	5	Sh.	3′	Y.	August	Rámári
patulum, *Thunb* ...	4	Sh.	4′	Y.	July ...	Almora, &c. ...
perforatum, *L* ...	7	Sh.	6″	Y.	July .	Naini Tál
elodeoides, *Chois.* ..	1, 2	Sh.	1′—4′	Y.	July ..	Jagesar, Rálam, Almora,
nepalense, *Chois.* ..	3	Sh.	1′	Y.	July ..	Kálámundi
japonicum, *Thunb*	8	Sh.	6″	Y.	July .	Almora, &c. .
XVI.—TERNSTRÆMIACEÆ.						
1. **Eurya.**						
acuminata, *D. C.* ..	...	Tr.	25′	Wh.	March ..	Naini Tál, &c
2. **Actinidia.**						
callosa, *Lindl.* ...	..	S. sc.	30′—40′	Wh.	May	Outer hills, Kapkot.
3. **Saurauja**						
nepalensis, *D C.* ..	....	Tr.	10′	Pk.	November,	Outer hills, &c ,
XVII – DIPTEROCARPEÆ.						
1. **Shorea.**						
robusta, *Gartn.* ...	...	Tr	60′–80′	...	April ...	Outer hills ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.* Rainy.	*Himálaya.* Dry.	Tibet.	Remarks.
River beds ...	1—1,500	R.	...	...	
Open river beds	11—13,500	...	D.	T.	
Do. ...	11—15,000	R.	D.	T.	
Do. ..	3—6,000	R.	...	...	
Do. ...	4,500	R.	...	...	
Do. ...	3—6.000	R.	...	...	
Do.	6,000	R.	...	..	
Do. ...	5—11,000	R.	...	...	
Banks ...	8,700	R.	...	...	
Open ...	4—6,000	R.	...	...	
Woods ...	3—8,000	R.	...	...	
Forest ...	2—3,500	R.	...	...	
Forest ...	3—5,000	R.	...	...	
Forest ..	1—2,000	R.	...	...	= *Vatica robusta*, in Herb. S. and W.

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flower.	Locality.
XVIII.—MALVACEÆ.						
1. **Malva.**						
verticillata, *L.* ..	2	H.	1'–6'	Pr.	August ...	Piti river ..
silvestris, *L* ..	1	H.	1'–2'	Li.	February.	Kota ...
2. **Sida.**						
humilis, *Willd.* ..	2	H.	3'	Or.	March ...	Outer hills ...
rhombifolia, *L.* ..	3	...	...	...	...	Almora
cordifolia, *L* ..	1	Sh.	3'	Y.	...	Almora, Bágesar.
3. **Abutilon.**						
polyandrum, *Schlecht*	2	Sh.	2'–8'	Y Or	August ...	Outer hills, Bágesar.
indicum, *G. Don.* ..	1	Sh.	6'–8'	Y.	March ...	Bhábar ...
4. **Urena.**						
lobata, *L.* ..	...	Sh.	4'	Pk.	August ...	Outer hills, Bágesar.
5. **Hibiscus.**						
radiatus, *Willd.* ..	3	...	5'	Y.	August ...	Below Almora,
Solandra, *L'Herit.* ..	...	H.	1'	...	August ...	Háwalbágh ...
vitifolius, *L.* ..	1	Sh.	...	Y.	August ...	Outer hills ...
pungens, *Roxb.* ..	...	H.	6'	Y.	August ...	Almora, &c. ...
cancellatus, *Roxb.* ...	...	H.	3'–4'	Y.	August ...	Almora, &c. ...
6. **Thespesia.**						
Lampas, *Dalz. & Gibs.*	...	Sh.	4'	...	August ...	Bhábar ...
7. **Kydia.**						
calycina, *Roxb.* ...	...	Tr.	20'	...	...	Bágesar, outer hills.

Plants—(continued).

Condition of soil, &c.	Elevation in feet above the sea.	Himálaya. Rainy.	Himálaya. Dry.	Tibet.	Remarks.
Open	7,500	R.	...	...	
Do.	2—2,000	R.	...	...	
Do.	4,000	R.	...	...	
Do.	5,000	R.	...	...	
Do.	3—5,000	R.	...	...	
Do.	1—4,500	R.	...	...	
Do.	1,000	R.	...	...	
Do.	1—3,000	R.	..	...	
Do.	4,000	R	...	...	
Do.	4,000	R.	...	...	= *Lagunea lobata* in Herb. S. and W.
...	4,000	R.	...	..	
Do.	4—5,000	R.	...	...	= *Abelmoschus* No. 3 in Herb. S. and W.
Do.	3—6,000	R.	...	...	= *Abelmoschus* No. 1 in Herb. S. and W.
Forest	1—2,000	R.	...	...	= *Hibiscus* No. 4 in Herb. S. and W.
Do.	2—3,000	R.			

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
XIX.—STERCULIACEÆ.						
1. Sterculia.						
villosa, *Roxb.* ...	1	Tr.	20′—30′	...	March ..	Outer hills ...
fulgens, *Wall.* ..	...	Tr.	30′—40′	..	March ...	Bhábar, outer hills.
2. Helicteres.						
Isora, *Wall.* ..	...	Sh.	5′—6′	...	January ..	Bhábar ..
3. Pterospermum						
acerifolium, *Willd.*	1	Tr.	30′	...	March ..	Hardwár ...
lanceæfolium, *Roxb.*,	2	Tr.	...	...	..	Bhábar ..
XX.—TILIACEÆ.						
1. Grewia.						
oppositifolia, *Roxb.* ..	4	Tr.	40′	Buff	May ..	BhímTál below,
asiatica, *L.* ..	2	...	...		...	...
var. *vestita* ..	5	Tr.	20′–30′	Buff	May ..	Kota, Bágesar,
lævigata, *Vahl.* ..	1	Sh.	15′	...	...	Outer hills ..
2. Triumfetta.						
pilosa, *Roth.* ..	2, 3	S. sc.	4′—5′	...	August ..	Kota, Almora, Bágesar.
rhomboidea, *Jacq.* ..	1	Sh.	1′—1½′	...	August ...	Háwalbágh ...
3. Corchorus.						
olitorius, *L.* ...	1	H.	2′	Y.	August ...	Háwalbágh ...
acutangularis, *Lam.* ..	2	H.	1′—2′	Y.	August ..	Háwalbágh ..
XXI.—LINEÆ.						
1. Linum.						
usitatissimum, *L.* ...	2	H.	2′	Bl.	January ...	Cultivated ...
2. Reinwardtia.						
trigyna, *Planch.* ...	...	Sh.	2′—5′	Y.	January ...	Outer hills ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himá-laya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Forest ..	3—4,500	R.			
Do. ..	2,500	R.	...	...	= *Firmiana colorata* in Herb. S. and W.
Do. ...	1—2,000	R.	...	...	
Do. ..	1,000	R.	..	...	
Do. ...	1,000	R.	..	...	
Do. ...	3,500	R.	...	...	
...	...	..	..	...	
Do. ...	2—3,500	R.	...	...	
Woods ...	2—3,500	R.	..	...	
Open ...	2, 5—5,000	...	...		
Do. ...	4,000	R.	...	...	
Do. ..	4,000	R.	...	...	
Do. ...	4,000	R.	...	...	
Fields ...	1—3,000	R.	...	...	
Open ..	1—7,000	R.	...	...	

List of Kumaon

Nam.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
XXII.-MALPHIGHIACEÆ.						
1. Hiptage.						
Madablota, *Gærtn.* ...	...	S. sc.	10′—15′	...	March ...	Outer hills ...
2. Aspidopteris.						
Wallichii, *Hook. f.* ...	1	S. sc.	10′—15′	...	August ...	Gango'i ...
Sp. ...	2	S. sc.	10′	...	March ...	Almora ...
XXIII.—GERANIACEÆ						
1. Biebersteinia.						
emodi, *Jaub. Spach.*	...	H	6″ 9″	Y.	July ...	Chirchun, &c.
2. Geranium.						
pratense, L. ...	9, 10	H.	1′	Pr.	June, September.	Kulhara, Laptel, Sákh.
collinum, *M. Bieb.* ...	1	H.	4″—8″	Pk.	July ...	Malári, Níti ...
Wallichianum, *Sweet*,	5	H.	2′	Pr.	July ...	Naini Tál, &c.,
Grevilleanum, *Wall.*...	6	H.	3′	Bl.	August ...	Rálam, Kulhara,
nepalense, *Sweet* ...	7	H.	9″	Pk.	March ...	Almora ...
rotundifolium, *L.* ...	4	H.	3″	Pk.	February,	Ganges valley,
Robertianum, *L.* ...	3	H.	1′—2′	Pk.	September,	Pandukesar ...
lucidum, *L* ...	2	H.	9″—12″	Pk.	March ...	Naini Tál ...
ocellatum, *Camb.* ...	8	H.	1′	Cr.	March ...	Outer hills ...
3. Oxalis.						
corniculata. *L.* ...	1	H.	6″	Y.	All the year.	Common ...
Acetosella, *L.* ...	2	H.	4″	Wh.	March ...	Dwáli ...
4. Biophytum.						
sensitivum, *DC.* ...	...	H.	4″	...	...	Kota Dún ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.* Rainy.	*Himalaya.* Dry.	Total.	Remarks.
Forest	1—3,000	R.	...	...	
Open	4,000	R.	.	...	
Do.	4,000	R.	...	...	
Open	16,500	...	...	T.	
Do.	10,500—14,000	R.	...	T.	
Do.	10,500 —13,000	...	D.	...	
Do.	7—12,000	R.	..	...	
Do.	11,000	R.	...	...	
Do.	4—6,000	R.	...	...	
Do.	2,000	R.	...	...	
Woods	6,500	R.	...	...	
Do.	6,500	R	...	...	
Shade	1,5—1,000	R	..	...	
Open	4—7,000	R.	...	...	
Forest	7—9,000	R.	...	...	
Shade	1,500	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
5. Impatiens.						
Balsamida, *L.* ...	20	H.	1'—2'	Pk.	August ...	Jágesar ...
Thomsoni, *Hook f.* ...	6,7, & 8,	H.	1¼"—10"	Pk. Y.	August ..	Milam, Gothing, Málam, Níti.
sulcata, *Wall.* ...	17	H.	8'	Pr.	August ..	Rálam, Kálamundi.
scabrida, *DC.* ...	9, 10	H.	2'—3'	Y.	August ...	Chiring, Naini Tál.
bicornuta, *Wall.* ...	4	H.	1' 3'	Li.	August ...	Kalimundi ...
amphorata, *Edgew.* ...	11, 13, & 15.	H.	1'—4'	Li., Pk., Pr.	August ..	Mohargári, Gori Valley Naini Tál, &c.
racemosa, *DC.* ...	1	H.	1'—2'	Y.	August ...	Jágesar
laxiflora, *Edgew.* ...	2, 3, & 19	H.	2'	Y.	August ..	Naini Tál, Jágesar, Binsar.
glauca, *H.f. & T.* ...	14	H.	4'	...	August ..	Dwáli ..
XXIV.—RUTACEÆ.						
1. Bœnninghausenia						
albiflora, *Reich.* ..	...	H.	2'—3'	Wh.	June ..	Naini Tál ...
2. Zanthoxylum.						
alatum, *Roxb.* ...	2, 3	Sh.	10'	...	March ...	Karim, Jalat, Bhím Tál.
acanthopodium, *DC.*,	4	Sh.	10'	Y. G.	March ...	Almora, &c. ...
oxyphyllum, *Edgew.* ...	...	S. sc.	10'—20'	Pk.	May ..	Káthi, Dwáli, &c.
3. Toddalia.						
aculeata, *Pers.* ...	1, 2	S. T.	20'—25'	G. Y.	February,	Bágesar, Bhábar.
4. Skimmia.						
Laureola, *Hook. f.* ...	...	Sh.	2'—3'	Y.	May ...	Naini Tál, &c.,
5. Glycosmis.						
pentaphylla, *Correa* ...	...	Sh.	4'	...	February,	Kota ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.* Rainy.	*Himálaya.* Dry.	Tibet.	Remarks.
Open ...	4—5,000	R.		...	
Do. ..	11,5—12,500	.	D.	...	
Do. ...	8,5—12,000	..	D.	...	
Shady woods ...	5—7,500	R.	...	...	
Do. ...	7,000	R.	...	..	
Do. ...	4,5—9,500	R.	...	..	
Shade ...	5,—9,000	R.	...	...	
Shade ...	6,—7,500	R.	...	..	
Shady woods...	9,500	R.	..	...	
Woods ...	4—7,000	R.	...	...	= *Ruta albiflora* in Herb. S. and W.
Open ...	4—7,000	R.	...	...	
Do. ...	...	R.	...	...	
Forest ..	7—8,500	R.	...	...	
Woods ...	1,5,—3,000	R.	...	...	
Forest ...	7,—9,500	R.	...	...	= *Limonia Laureola* in Herb. S. and W.
Do. ...	2,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
6. Murraya.						
exotica, *L.* ...	...	Sh.	10'–15'	Wh.	March ...	Outer hills ..
Kœnigii, Spreng. ...	...	T.	20'	...	March ...	Bhábar ...
7. Citrus.						
medica, *L.* ...	1,2	Sh.	10'	Wh.	May ...	Bágesar, outer hills.
8. Ægle.						
Marmelos, *Correa* ...	...	T.	20'	...	...	Bhábar ...
XXV.—SIMARUBACEÆ						
1. Picrasma.						
quassioides, *Benn.* ...	...	T.	20'		...	Bandkesar ...
XXVI.—BURSERACEÆ.						
1. Garuga.						
pinnata, *Roxb.* ...	...	T.	40'	...	February,	Bhábar ..
XXVII.—MELIACEÆ.						
1. Melia.						
Azadirachta, *L.* ...	...	T.	15'—20'	Li.	March ...	Almora, &c. ...
2. Cedrela.						
Toona, *Roxb.* ...	1	T.	30'—60'	Wh.	March ...	Kota Dún, &c.
var. *serrata* ...	2	T.	20'—40'	Pk.	June ...	Bándari-devi, &c.
XXVIII.—OLACINEÆ.						
1. Olax.						
nana, *Wall.* ...	...	Sh.	9"—12"	...	July ...	Damus ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.* Rainy.	*Himalaya.* Dry.	Tibet.	Remarks.
Open ...	2—1,500	R.	...	...	
Forest ...	1—2,000	R.	...	...	= *Bergera Kœnigii* in Herb. S. and W.
Woods ...	2—3,000	R.	...	...	
Forest ...	1—2,000	R.	...	...	
Open ...	6,5—8,000	R.	...	...	
Forest ...	1,000	R.	...	...	
Gardens ...	1—5,000	R.	...	...	
Forest ...	1·3,500	R.	...	...	
Do. ...	6—7,500	R.	...	...	
Open ...	4,500	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
XXIX.—ILICINEÆ.						
1. Ilex.						
dipyrena, *Wall.* ...	3	T.	30′—40′	W.	April ..	Naini Tál, outer hills.
odorata, *Ham* ..	2	T.	40′	W.	May ..	Do. ...
excelsa, *Wall*	1	T.	25″	W.	May ..	Binsar ...
XXX.—CELASTRINEÆ.						
1. Euonymus.						
tingens, *Wall.* ..	6, 7	Tr.	20′—30′	...	April, May,	Naini Tál, Binsar, Mádhári Pass.
fimbriatus, *Wall* ...	4, 5	T. or S.	10′—30′	...	May ...	Dwáli, Níti Dugli, &c
echinatus, *Wall.* ...	3	S sc.	20′	...	May ...	Dwáli, &c. ...
pendulus, *Wall.* ...	2	T.	30′—40′	...	March ..	Gagár, &c. ...
Hamiltonianus, *Wall.*	1	Sh.	12′ 30′	...	...	Almora ...
2. Celastrus.						
paniculata, *Willd.* ...	2	Sh.	15′	...	...	Bhím Tál ...
3. Gymnosporia.						
ruta, *Wall.* ...	1, 4	Sh.	4′—12′	W. G.	March, May,	Sarju Valley, Bágesar.
Royleana, *Wall.* ...	3	Sh.	12′	...	...	Bhím Tál ...
4. Elæodendron.						
glaucum, *Pers.* ...	...	T.	20′—30′	...	May ...	Outer hills, Bhím Tál.
XXXI.—RHAMNEÆ						
1. Ventilago.						
calyculata, *Tulasne* ...	...	S. sc.	20′—30′	...	March ...	Bhábar ...
2. Zizyphus.						
Œnoplia, *Mill.* ...	2	T.	...	...	...	Rikikhes ...
rugosa, *Lam* ...	1	T.	15′	...	March ...	Kota Dún ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himálaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Forest ...	5—9,000	R.	...	...	
Do. ...	3 - 4,000	R.	...	...	
Do. ...	4—7,000	R.	...	...	
Forest ...	5,5—10,000	R.	...	...	
Do. ...	8—11,000	R.	...	...	
Do ...	7—8,000	R.	...	...	
Do. ...	6—7,000	R.	...	...	
Open ...	5,000	R.	...	...	
Do. ...	4—5,000	R.	...	...	
Forest ...	3,000	R.	...	...	
Open ...	4—5,000	R.	...	...	
Forest ...	2—4,500	R.	...	...	
Forest ...	1—2,000	R.	...	...	
Do. ...	1—2,000	R.		...	
Do. ...	2,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
3. Berchemia.						
floribunda, *Wall.* ...	...	S. sc.	15′	...	...	Almora ...
4. Rhamnus.						
persicus, *Boiss.* ...	7	Sh.	3′	...	June ..	Níti. Milam ...
dahuricus, *Poll.* ...	1	Sh.	15′	G. Y.	April ...	Naini Tál, Bágesar.
purpureus, *Edgew.* ...	4, 5	T.	20′—30′	...	March, April,	Naini Tál, Binsar, Mádhári Pass.
triqueter, *Wall.* ...	...	T.	15′	...	August ...	Outer Hills, Almora
procumbens, *Edgew.*	3	Sh.	4′	...	May ..	Naini Tál, Jagthana.
5. Hovenia.						
dulcis, *Thunb.* ...	...	T.	40′	Y. G.	June ..	Bágesar ...
6. Sageretia.						
oppositifolia, *Brongn.*,	...	Sh.	10′—12′	...	August ..	Almora ...
7 Gouania.						
leptostachya, *D C.* ..	2	S. sc.	20′	...	...	Bhábar ...
8 Helinus.						
lanceolatus, *Brand.* ..	...	S. sc.	10′—12′	...	February,	Kota Dún, &c.,
XXXII.—AMPELIDEÆ.						
1. Vitis.						
pallida, *W and A.* ...	...	S. sc.	...	...	...	...
lanata, *Roxb.* ...	2, 3, 5 & 6	S. sc.	6′—20′	...	May, June,	Naini Tál, Almora, [illegible]gar, Námik, Káthi, Dowáli-khál.
parvifolia, *Roxb* ...	1	S. sc.	10′—15′	...	April ...	Pyúra, Almora,
himalayana, *Brand.*...	9	S. sc.	20′	...	May ..	Mádhári Pass, Dhákri-binaik.
divaricata, *Wall.* ...	8	S. sc.	10′	...	June ...	Naini Tál, outer hills.
capriolata, *Don.* ...	...	S. sc.	20′	...	May ...	Naini Tál, Ka[illegible]
lanceolaris, *Roxb.* ...	...	S. sc.	[illegible]	...	March ...	Kota Dún, &c.,

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himalaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	4,500	R.	...	.	
Do. ...	11,500	...	D.	...	
Forest ...	3—6,5 0	R.	...	..	= *Ceanothus* No. 2 in Herb. S. & W.
Do. ...	7—8,000	R.	...	..	
Open ..	5,500	R.	...	...	= *Ceanothus* No. 1 in Herb. S. & W.
Do. ...	6 7,000	R.	...	..	
Forest ...	3—5,000	R.	...	...	
Open ...	2—5,000	R.	...	..	
Forest ...	1–2,000	R.	...	...	
Open ...	2—3,000	R.	...	...	= *Gouania* No. 1 in Herb. S. & W.
...	...	...	...	...	= *Cissus* No. 1 in Herb. S. & W.
Woods or open,	4,5—7,000	R.	...	...	
Open ...	4—6,000	R.	..	...	
Forest ...	7—8,000	R.	...	...	= *Ampelopsis* No. 1 in Herb. S. & W.
Open ...	3—7,000	R.	...	...	
Forest ...	6—7,500	R.	...	...	= *Ampelopsis* No. 2 in Herb. S. & W.
Do. ...	3,000	R.	...	...	= *Cissus* No. 2 in Herb. S. & W.

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
2. Leea.						
aspera, *Wall.* ...	...	Sh.	4'—5'	...	June ...	Almora, &c. ...
XXXIII.—SAPINDACEÆ.						
1. Cardiospermum						
Halicacabum, *L.* ..	...	H. sc.	10'	...	...	Bágesar ...
2 Æsculus.						
indica, *Colebr* ..	...	T.	40'—81'	Pk. Y.	May ...	Dwáli, &c. ...
3. Schleichera.						
trijuga, *Willd.* ..	...	T.	30'	...	...	Bhábar ...
4. Sapindus.						
Mukorossi, *Gærtn.* ..	...	T.	30'	...	...	Bígesar ...
5. Acer.						
oblongum, *Wall.* ..	1	T.	30'	Gr.	April ..	Naini Tál. &c...
lævigatum, *Wall.* ..	2	T.	40'	Gr.	April ...	Gágar, &c. ...
cæsium, *Wall.* ..	4	T.	50'	Gr.	March ...	Dwáli ...
villosum, *Wall.* ..	5	T.	50'	Gr.	March ...	Mádhári Pass, &c.
caudatum, *Wall.* ..	6	T.	30'	Gr.	March ...	Ditto ...
pictum, *Thunb* ..	3	T.	30'	Gr.	March ...	Naini Tál ...
6. Staphylea.						
Emodi, *Wall.* ..	...	Sh. T.	20'	Wh.	May ...	Gágar, Binsar,
XXXIV.—SABIACEÆ.						
1. Sabia.						
campanulata, *Wall.* ..	1	S. sc.	10'—15'	Pr.	March ...	Gágar, Námik,
purpurea, *H.f. and T.*	3	Sh.	10'	...	May ...	Sarju valley, Bágesar.
paniculata, *Edgew.* ...	2	S. sc.	30'—40'	...	March ...	Outer hills ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	4—5,000	R.	...	...	
Forest ...	3,000	R.	...	..	
Do. ..	6—9,000	R.	...	...	= *Pavia indica* and *Engelhardtia* No. 2 in Herb. S.& W.
Do. ..	1,500	R.	...	...	
Do. ..	8,000	R.	...	...	
Do. ...	4—7,000	R.	...	...	
Do. ...	6—7,000	R.	...	...	
Do. ...	8,300	R.	...	...	
Do. ...	7—5,900	R.	...	...	
Do. ...	7, 5—11,000	R.	...	...	
Do. ...	6—8,500	R.	...	...	
Do. ...	7—8,000	R.	...	...	
Do. ...	6—8,000	R.	...	...	
Do. ...	3,000	R.	...	...	
Do. ...	1—2,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
2. Meliosma						
dilleniæfolia, *Wall.* ..	2	T	40′	Wh.	June ...	Námik, &c.
pungens, *Wall.* ..	1	T.	40′	Wh	May ..	Kapkot, Binsar,
XXXV.—ANACARDIACEÆ.						
1. Rhus.						
Cotinus, *L.* ..	2	Sh.	10′	Pk.	April ..	Gágar, Almora.
parviflora, *Roxb.* ...	1	T.	20′	...		Almora, &c.
semialata, *Murray* ...	4	T.	15′	...	June ..	Almora, &c. ...
succedanea, *L.* ..	3	T.	20′	...	March ..	Bagesar ..
2. Pistacia.						
integerrima, *Stewart*,	...	T.	30′—40′	...	May ...	Thakalo, Kosi River.
3. Mangifera.						
indica, *L.* ...	...	Tr.	40′	Y.	April ...	Bhábar, plains, Almora, &c.
4. Buchanania.						
latifolia, *Roxb.* ...	...	Tr.	30′	Wh.	March ...	Outer hills ..
5. Odina.						
Wodier, *Roxb.* ...	...	Tr.	30′	Wh.	March ...	Bhábar ..
6. Semecarpus.						
Anacardium, *L. f.* ...	...	Tr.	30′—40′	...	January ...	Outer hills ...
7. Spondias.						
mangifera, *Willd.* ...	...	Tr.	...	...	...	Bhábar ...
XXXVI.—CORIARIEÆ.						
1. Coriaria.						
nepalensis, *Wall.* ...	...	Sh.	10′—12′	...	February,	Common ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.* Rainy.	*Himalaya.* Dry.	Tibet	Remarks.
Do. ...	7,5—9,000	R.	...	...	
Do. ...	3,5 – 7,500	R.	...	...	
Do. ..	5—5,000	R.	...	..	
Do. ...	3--5,000	R.	...	...	
Do. ...	4—6,500	R.	...	...	
Do ...	3--3,500	R.	...	...	
Do. ...	2—5,000	R.	...	...	= *Rhus integerrima* in Herb. S. and W.
Cultivated ...	1—2,500	R.	...	...	
Forest ...	1—2,000	R.	...	...	
Do. ...	1,000	R.	...	...	
Do. ...	1—2,000	R.	...	...	
Do. ...	1—2,000	R.	...	...	
Open ...	2—7,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
XXXVII.—MORINGIEÆ.						
1. **Moringa.**						
pterygosperma, *Gærtn.*	...	T.	40′	Pk.	March ...	Bhábar ...
XXXVIII.—LEGUMINOSÆ.						
1. **Piptanthus.**						
nepalensis, *D. Don.* ...	...	Sh.	10′	Y.	May ...	Káthi Pass ...
2. **Thermopsis.**						
barbata. *Royle.* ...	1	H.	2′	Y. ?.	July ...	Milam, Rálam,
inflata, *Camb.* ...	2	H.	6″ - 9″	Y.	July ...	Raj-hoti ...
3. **Argyrolobium.**						
flaccidum, *Jaub. & Spach.*	1	Sh.	1′	R.	July ...	Naini Tál ...
roseum, *Jaub. & Spach.*	2	Sh.	1′	R.	July ...	Kál á pathara, &c.
4. **Crotalaria.**						
prostrata, *Roxb.* ...	9	H.	6″	Y. ?	July ...	Almora ...
humifusa, *Grah.* ...	11	H.	6″	Y.	...	...
alata, *Ham.*	3	H.	1′	Y.	July ...	Almora ...
mysorensis, *Roth.* ...	4	H.	2′	Y. ?	August ...	Háwalbágh ...
albida, *Heyne* ...	7	H.	1′	Y.	April ...	Almora, &c. ...
calycina. *Schrank* ...	5	H.	6″—9″	Bl. ?	August ...	Almora ...
sessiliflora, *L* ...	2	H.	1½′—2′	Bl.	July ...	Almora ...
sericea, *Retz.* ...	6	H.	3′—4′	Y.	February,	Naini Tál, Bágesar.
tetragona, *Roxb.* ...	1	H.	6′	Y.	September,	Sarju valley ...
medicaginea, *Lam.* ...	...	...	...	...	...	...
var. *neglecta* ...	8	H.	2″	Y.	March ...	Kota Dún ...
incana, *L.* ...	10	H.	2′	Y.	July ...	Almora ...
5. **Parochetus.**						
communis, *Ham.* ...	...	H. cr.	6″	Bl.	May ...	Chaur, Rálam, &c

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himalaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Forest ...	1—2,500	R.	...	...	
Do. ...	2,000	R.	...	...	
Open ..	10—12,000	R.	D.	...	
Do. ...	13—16,000	.	D.	T.	
Do. ...	7—8,000	R.	...	...	
Do. ...	2,5—3,500	R.	...	...	
Open ..	3—4,500	R.	...	...	
...	?	...	...	...	
Do. ...	3—5,500	R.	...	...	
Do. ...	4,000	R.	..	.	
Do. ..	4—6,500	R.	...	..	
Do. ..	6,500	R	...	...	
Do. ...	5—8,000	R.	..	...	
Do. ...	3—5,000	R.	...	...	
Do. ...	3,500	R.	...	...	
...		...	...	..	
Do. ...	2,000	R.	..	...	
Gardens ...	5,500	R.	...	...	
Open ...	6—12,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
Trigonella.						
Fœnum-græcum, *L.* ...	7	H.	...	...	...	Almora ...
gracilis, *Benth* ...	3	H.	3′	Y.	July ...	Naini Tál ...
pubescens, *Edgew.* ...	6	H.	1¼′	Y.	June ...	Naini Tál ...
emodi, *Benth* ...	1	H.	2′	Y.	July ...	Sáha ...
corniculata, *L.* ..	2	H.	6″—9″	Y.	June ...	Ramri, Níti ...
Melilotus.						
parviflora, *Desf.* ..	1	H.	1½′	Y.	March ...	Almora, &c. ...
alba, *Lam.* ...	2	H.	3′	Wh.	February,	Haldwáni ...
Medicago.						
lupulina, *L* ...	1	H. gr.	3″	Y.	March ...	Outer hills ...
denticulata, *Willd.* ...	2	H.	9″	Y.	March ...	Bhábar ...
Lotus.						
corniculatus, *L.* ..	...	H.	6″	Y.	All the year.	Almora &c. ...
Indigofera.						
trifoliata, *L.* ..	2	H.	9′	Pr.	August ..	Almora, Sarju valley.
hirsuta, *L.* ...	1	H	12″	Pr.	July ..	Almora ...
Gerardiana, *Wall.* ...	..	...	...	...	...	..
var. heterantha ...	3	Sh.	3′—5′	Pr.	January ...	Almora, Binsar,
atropurpurea, *Ham.*..	4	Sh	8″	Pr.	June ...	Gangoli, &c. ...
hebepetala, *Benth* ...	4½	Sh.	8′	Pr.	June ...	Kathi ...
pulchella, *Roxb.* ...	5	Sh.	8′—10′	Pk.	February.	Outer hills, Bágesar,
Dosua, *Ham* ...	6	Sh.	2′—3′	Pk.	June ...	Binsar, &c. ...
Milletia.						
auriculata, *Baker* ...	..	T. sc.	30′—40′	...	...	Bhábar ...
Tephrosia.						
candida, *DC.* ...	1	Sh.	8′—10′	.	January ..	Kota Dún ...
purpurea, *Pers.* ...	2	Sh.	1′—2′	Pk.	March ..	Do. ...
Sesbanea.						
aculeata, *Pers.* ...	...	H	2′	Y.	August ...	Háwalbágh ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Rainy			Remarks.
Cultivated	6,000	R		.	
Open	7,000	R		..	
Do.	7,000	R		..	
Woods	9,000	R		..	
Open	9—11,500	R		.	
Do.	1—5,500	R.	.	...	
Do	1,600	R	...	...	
Do.	4,000	R.	...	...	
Do.	1,000	R.	...	..	
Do.	4,700	R.	...	...	
Do.	4,000	R.	..	...	
Do.	4—5,000	R.	...	..	
...	...		...	...	
Do.	4—7,000	R.	..	.	
Do.	4—6,000	R.	...	..	
Do.	7,000	R	...	..	
Do.	2—6,500	R.	...	..	
Woods	6—8,500	R.	...	...	
Forest	1—3,500	R.	...	...	
Open	2,000	R.	...	...	
Do.	2,000	R.	...	...	
Fields	4,000	R.	..	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
Caragana.						
pygmæa, *DC.* ...	1	Sh.	1′—4′	Y.	July	Gugé plains ..
Gerardiana, *Royle* ..	2	Sh.	3′	Y.	July	Dhauli river ...
polyacantha, *Royle* ...	4	Sh		...	...	?
crassicaulis, *Benth.* ...	3	Sh.	3″—4″	Or.	July ..	Pindari, Milam,
Astragalus.						
trichocarpus, *Grah.* ..	1	H.	3′	Pk.	April ...	Naini Tál ..
hosackioides, *Benth*	...	H.	1′—1½′	Y. Or.	March ..	Naini Tál ..
strictus, *Grah* .	11	H.	4″—6″	Bl.	September,	Shelong .
melanostachys, *Benth.*	12	H.	6″	..	July ..	Rajhoti
inconspicuus, *Baker*,	10	H.	6′	Bl.	August	Ralam valley .
himálayanus, *Klotzsch*,	13	H.	6″	..	August	Milam
leucocephalus, *Grah*	...	H.	2″	Bl.	July ...	Milam, Níti
chlorostachys, *Lindl.*.	5	H.	2′	Y.	July ...	Tola (Gori R.), Dwáli
emodi, *Steud.* ...	4	H.	2′	...	July ...	Gori river
graveolens, *Ham.* ...	2	H.	2′—3′	Y	March ...	Outer hills ..
Webbianus, *Grah.*	7	Sh.	6″—8″	Y.	July ..	Gugé plains ...
polyacanthus, *Royle*	6	Sh.	1½′	Y.	August .	Dhauli river
multiceps, *Wall.* ..	8	Sh.	3″—4″	Y.	August ...	Milam ..
Oxytropis.						
lapponica, *Gaud*	7	H.	4″ 6″	Pr.	July ..	Rajhoti ..
Stracheyana, *Benth*	5	H.	2″	Bl	August ..	Gugé plains
tatarica, *Jacquem.* .	3, 4	H.	2″—4″	Pr	July - August	Rajhoti, Gugé plains.
microphylla, *DC.* ...	2	H.	3″	...	July ..	Gugé plains
Lezpedeza.						
sericea, *Miq.* ..	4	Sh.	4′—8′	Pk.	February,	Rámganga river.
Gerardiana, *Grah.* ...	2	Sh.	1½′	Pk.	August	Almora, &c. ..
eriocarpa, *DC.* ...	3	Sh.	4′—5′	Pk.	February,	Gágar, Kálimat,
Hedysarum.						
Kumaonense, *Benth.* .	...	Sh.	9″	...	August ..	Gori river ...
Stracheya.						
tibetica, *Benth.* ...	...	H.	1″—2″	...	July ...	Tisum ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	14—17,000	...	D.	T.	
Do. ...	9—12,000	...	D.	...	
...	?	...	D?.	...	
Do. ...	12—15,000	R.	D.	T.	
Do. ...	7,000	R.	...	...	
Do. ...	6—7,000	R	...	...	= *Podolætus hosackioides* in Herb. S. and W.
Do. ...	13—15,500	...	D.	T.	
Do. ...	15,000	..	...	T.	
Do. ...	9,000	R.	...	...	
Do. ...	12,300	...	D.	...	
Do. ...	11—15,000	...	D.	T.	= *Guldenstaedtia uniflora* in Herb. S. and W.
Do. ...	8—11,500	R.	D.	...	
Do. ...	10,000	R.	...	...	
Do. ...	2,000	R.	...	...	
Do. ...	15,000	...	...	T.	
Do. ...	7,000	R.	...	...	
Do. ...	11,500	...	D.	...	
Do. ...	15,000	...	...	...	
Do. ...	15,500	...	...	T.	
Do. ...	15,500	...	...	T.	
Do. ...	15,500	...	...	T.	
Do. ...	4,500	R.	...	...	
Do. ...	5—6,500	R.	...	...	
Do. ...	6,000	R.	...	...	
Rocks ...	9,000	R.	...	...	
Open ...	15,000	...	...	T.	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.		Colour of flower.	Time of flowering.	Locality.
Zornia.						
diphylla, *Pers.* ...	1, 2	H.			June ...	Almora ...
Smithia.						
ciliata, *Royle* ...	...	H.			July ...	Almora ...
Æschynomene.						
indica, *L.* ...		H.			July .	Almora ...
Uraria.						
picta, *Desv.* ...	1	H.	1′—6′	P.	July ...	Bágesar ...
lagopus, *DC.* ...	2	H.	1′—3′	Y.	August ...	Almora, Paton,
Alysicarpus.						
vaginalis, *DC.* ...	2	H	9″—12″	...	July ..	Almora ..
bupleurifolius, *DC.*,	1	H.		..	July ...	Háwalbágh ...
rugosus, *DC* ...	3	H.		..	July ...	Do. ..
Ougeinia.						
dalbergioides, *Benth.*,	...	T.	30′	Pk.	October ...	Outer hills ...
Desmodium.						
laburnifolium, *DC.*,	...	Sh.		...	August ...	Bágesar valley,
triquetrum, *DC.* ...	...	Sh.	2′	...	August ...	Baiznáth ...
laxiflorum, *DC.* ...	5	Sh.	4′	Pk.	August ...	Sarju river ...
podocarpum, *DC.* ...	8	Sh.	3′	Pk.	August ...	Naini Tál below.
floribundum, *D. Don*,	2	Sh.	2′—3′	Pk. W.	July ...	Naini Tál ...
oxyphyllum, *DC.* ...	9	Sh.	3′—6′	Li.	July ...	Naini Tál below.
tiliæfolium, *G. Don.*,	6	Sh.	6′—10′	Pk.	August ...	Gori river ...
gangeticum, *DC.* ...	1	Sh.	3′—4′	...	March ...	Káládhúngi, Bhábar.
sequax, *Wall.* ...	7	Sh.	3′	Pk.	August ...	Naini Tál below.
concinnum, *DC.* ...	10	Sh.	2′	Li.	August ...	Binsar ...
polycarpum, *DC.* ...	...	...	...	...	...	...
var. trichocaulon ...	14	S. cr.	1′	Pr.	August ...	Almora, Naini Tál.

Plants—(continued).

Conditions of soil, &c.		Elevation in feet above the sea.	*Himálaya*		Tibet.	Remarks.
			Rainy.	Dry.		
Open	...	4,000	R.	...	...	
Wet	...	4,000	R.	...	...	
Do.	...	4,000	R.	.	...	
Open	...	3,000	R.	.	...	
Do.	...	4–5,500	R.	.	..	
Do.	...	4,000	R.	...	...	
Do.	...	4,000	R.	..	..	
Do.	..	4,000	R.	..	...	
Do.	..	1–4,000	R.	..	...	
Woods	...	3,000	R.	...	...	=*Catenaria laburnifolia* in Herb. S. and W.
Open	..	4,500	R	...	...	=*Pteroloma triquetrum* in Herb. S and W.
Forest	...	3–6,000	R.	..	..	
Woods	...	6,500	R.	...	...	
Forest	..	4–7,000	R.	..	...	
Woods	...	6–8,000	R.	..	...	
Forest	...	5–6,000	R.	...	.	
Do.	...	1–2,500	R.	...	...	
Do.	...	4,000	R.	...	...	
Woods	...	4–6,000	R.	...	...	
...		...	.	...	...	
Open	...	4–7,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
triflorum, *DC.*	13	H.	1′	Pk.	August	Almora
heterophyllum, *DC.*,	13½	H.	1′	Pk.	...	Do.
parvifolium, *DC.*	4	S. cr,	1′	Pk	August	Almora, Naini Tál.
gyrans, *DC.*	11	Sh.	3′	Pr.	August	Almora
Abrus.						
precatorius, *L.*	1	S. sc.	4′—8′	...	February,	Bhábar
pulchellus, *Wall.*	2	S. sc.	8′—10′	...	February,	Kota dún, &c.,
Cicer.						
arietinum, *L.*	2	H.	1′	Bl.	March	Bhábar
soongaricum, *Steph.*	1	H.	1′—2′	Bl.	July	Milam, Laptel,
Vicia.						
tetrasperma, *Mœnch.*,	...	H. cr.	1′—2′	Bl.	March	Almora
hirsuta, *Koch.*	...	H. cr.	1′—2′	Bl.	March	Do.
tenera, *Grah.*	3	H.	1′	Pr.	April	Rámgar, Naini Tál.
rigidula, *Royle*	2	H.	10′—15′	Pk. W.	August	Jalat, &c.
sativa, *L.*	4	H.	1′	Pr.	July	Naini Tál
var. angustifolia	1	H.	6″	Pk.	March	Almora
Lathyrus.						
Aphaca, *L.*	1	H.	1′	Y.	March	Almora
sativus, *L.*	3	H.	2′	D. Pr.	March	Sirmora
sphæricus, *Retz.*	2	H.	6″—9″	R.	March	Almora
luteus, *Baker*	...	H.	4′	Y.	May	Mádhári Pass
Pisum.						
sativum, *L.*	...	H.	2′	Wh.	March	Common
Shuteria.						
vestita, *W. & A.*	...	...	...	...	...	...
var. involucrata,	2	S cr.	...	...	...	Naini Tál, &c.
„ densiflora	1	S cr.	10′—15′	...	February,	O[illegible] hills
Dumasia.						
villosa, *DC.*	...	S cr.	4′	Pr.	August	Almora, &c.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	4,000	R.	...	...	
Do. ...	4,000	R.	...	...	Not found in Herb.
Forest ..	5—7,000	R.	...	...	
Open ...	4—6,000	R.	...	...	
Forest ...	1—2,000	R.	...	...	
Do. ...	3—4,000	R.	...	...	
Cultivated ...	1—2,000	R.	...	...	
Open ...	11,500—14,500	...	D.	T.	
Fields ...	1,5—5,500	R.	..	...	
Do. ...	1,5—5,500	R.	...	...	= *Ervum* No. 2 in Herb. S. & W.
Woods ...	5—7,000	R.	...	...	= *Ervum* No. 1 in Herb. S. & W.
Open & Woods	5—7,000	R.	...	...	
Woods ...	7,000	R.	...	...	
Fields ...	1,5—5,500	R.	...	...	
Do. ...	1,5—5,500	R.	...	...	
Do. ...	4,000	R.	...	...	
Do. ...	1,5—5,500	R.	...	...	
Woods ...	8—9,000	R.	...	...	= *Orobus luteus* in Herb. S. & W.
Cultivated ...	1—5,000	R.	...	...	
...	...		...	...	
Woods ...	3—6,000	R.	...	..	
Do. ...	2,500	R.	...	...	
Open ...	3,500	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
Glycine.						
Soja, *Sieb. and Zucc.*,	...	H.	...	...	August ...	Almora, &c. ...
Mucuna.						
atropurpurea, *DC.* .	2	S. sc.	20′—30′	Pr.	August ...	Kota Dún, &c.,
pruriens, *DC* ...	1	S. sc.	10′—15′	Pr.	August ..	Kota Dún, &c.,
Erythrina.						
stricta, *Roxb.* ...	3	Tr.	...	...	...	Outer hills ...
suberosa; *Roxb.* ...	2	Tr.	30′	Sc.	June ...	Outer hills .
arborescens, *Roxb.* ..	1	Sh.	3′	Sc.	August ...	Almora, Jalat,
Galactia.						
tenuiflora, *W. and A.*,	...	S. sc.	...	...	August ...	Gangoli ..
Spatholobus.						
Roxburghii, *Benth.* ...	...	H. sc.	50′	...	...	Bhábar ...
Butea.						
frondosa, *Roxb.* ..	1	Tr.	25′	Sc.	March ...	Do. ...
Pueraria.						
tuberosa, *DC.* ..	...	S. sc.	10′—20′	Bl.	March ...	Outer hills ...
Stracheyi, *Baker* ..	...	H. sc.	5′—6′	B.	August ...	Kalimundi ...
Phaseolus.						
calcaratus, *Roxb.* ..	...	H. sc.	...	Y.	August ...	Almora ...
Vigna.						
vexillata, *Benth.* ...	...	H. sc.	2′	Pk.	August ...	Jágesar ...
Dolichos.						
Lablab, *L.* ...	...	H.	...	...	...	Almora ...
biflorus. *L.* ...	1	H. sc.	1′—1¼′	...	August ...	Almora ...
falcatus, *Klein.* ...	2	H. sc.	5′	Pk.	August ...	Gangoli, Naini Tál.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.* Rainy.	*Himálaya.* Dry.	Tibet.	Remarks.
Cultivated ...	1—5,500	R.	...	...	
Open ...	3—6,000	R.	...	...	Not found in Herb. S. & W.
Do. ...	2,5—4,000	R.	...	...	Not found in Herb. S. & W.
Forest ...	1—5,000	R.	...	...	Not found in Herb. S. & W.
Do. ...	2,500	R.	...	...	
Open ...	4—6,200	R.	...	...	
Do. ...	4,000	R.	...	...	
Forest ...	1,000	R.	...	...	= *Butea parviflora* in list. Not found in Herb. S. & W.
Do. ...	1,000	R.	...	...	Not found in Herb. S. & W.
Woods ...	2—4,000	R.	...	...	
Woods ...	6—7,500	R.	...	...	= *Neustanthus* sp. in Herb. S. & W.
Open ...	4—5,000	R.	...	...	
Do. ...	5—7,000	R.	...	...	
Cultivated ...	1—5,000	R.	...	...	= *Lablab vulgaris* in list, Not found in Herb. S. and W.
Do. ...	1—6,000	R.	...	...	
Open ...	5—7,500	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
Atylosia.						
mollis, *Benth.* ...	2	S. sc.	15′—20′	Y.	March ...	Sarju valley, Bhábar.
grandiflora, *Benth* ...	1	S. sc.	6′—12′	Y.	September,	Bágesar ..
scarabæoides, *Benth.*,	3	H.	1′	Y.	August ...	Almora ...
Cajanus.						
indicus, *Spreng.* ...	...	H.	2′	Y.	October ...	Ganai ...
Eriosema.						
chinense, *Vogel* ..	...	H.	1′	Y.	August ...	Almora ...
Rhynchosia.						
pseudo-cajan, *Camb* .	1	Sh.	8′	Y.	August ..	Kosi and Sarju valleys.
himálensis, *Benth.* ...	3	H. sc.	10′	Y. Pr.	August ..	Gágar, &c. ...
sericea, *Spanoghe* ...	2	H. cr.	6′	Pr.	August ..	Kilimundi river.
vestia, *Benth.* ...	4	H. sc.	3′-4′	R.	August ..	Naini Tál, Binsar, &c.
Flemingia.						
strobilifora, *R. Br.* ...	4	Sh.	1′	Pk.	August ..	Almora, Binsar,
paniculara, *Wall.* ...	3	Sh.	1′	...	August ..	Outer hills ...
congesta, *Roxb.* ...	5	Sh.	2′—3′	Pk.	August ..	Bhábar ...
var. semialata ...	1, 2	Sh.	1′- 3′	...	July ...	Bágesar, Almora, &c.
Dalbergia.						
Sissoo, *Roxb.* ...	1	Tr.	25′	Pk.	February,	Bhábar ...
confertiflora, *Benth* ...	2	S. sc.	15′	Li.	March ..	Do. ...
volubilis, *Roxb.* ...	3	Tr.	20′—30′	Pk.	May ...	Kosi valley, ...
Sophora.						
mollis, *Grah.* ...	...	Sh.	6′—8′	Y.	February,	Common ...
Cæsalpinia.						
Bonducella, *Fleming*,	...	S. sc.	10′—15′	Y.	March ...	Kota, &c. ...
sepiaria, *Roxb.* ...	...	S. sc.	10′—15′	Y.	March ...	Do. ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Hima-laya.* Rainy.	*Hima-laya.* Dry.	Tibet.	Remarks.
Woods ...	1—4,000	R.	...	...	
Do. ...	3,000	R.	...	...	
Open ...	4—5,000	R.	...	...	
Cultivated ...	3,000	R.	...	...	Not found in Herb S.& W.
Open ...	5—6,000	R.	...	...	
Do. ...	3—4,000	R.	..	...	
Do. ...	6—7,000	R	...	...	
Do. ...	2—5,500	R.	..	...	
Do. ...	6—7,500	R.	...	...	Not found in Herb. S & W.
Do. ...	3, 5—8,000	R.	...	...	
Forest ...	2,500	R.	...	...	
Do. ...	1—2,000	R.	...	.	
Woods & open,	3—6,000	R.	...	...	
Forest ...	1—2,000	R.	...	...	
Do. ...	1—2,000	R.	...	...	Not found in Herb. S. & W.
Do. ...	3—4,000	R.	...	...	
Open ...	3,5—5,000	R.	...	...	=*Edwardsia mollis* in Herb. S. & W.
Do. ...	2—3,000	R.	...	...	=*Guilandina Bonducella* in Herb. S. & W.
Do. ...	2—5,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
Cassia.						
Fistula, *L.*	1	Tr.	25′	Y.	April	Outer hills
occidentalis, *L.*	2	H.	2′—3′	Y.	March	Bágesar, &c.
Sophera, *L.*	3	H.	3′-4′	Y.	March	Outer hills
Tora, *L.*	4	H.	3′	Y.	All the year.	Bágesar, &c.
Absus, *L.*	5	H.	1′	Y.	August	Almora, &c
mimosoides, *L.*	...	...			...	...
var, Wallichiana	7	H.	1′-1½′	Y.	August	Do.
Saraca.						
indica, *L.*	...	Tr.	23′	R. Or.	March	Kota Dún
Tamarindus.						
indica, *L.*	...	Tr.	60′-80′	...	...	Bhábar
Bauhinia.						
malabarica, *Roxb.*	...	Tr.	25′	...	...	Bhábar
retusa, *Ham.*	...	Tr.	20′ 40′	Pk.	September,	Kosi valley
Vahlii, *W. & A.*	...	S. sc.	20′ 40′	Pk.	January	Bhábar, outer hills
variegata, *L.*	...	Tr.	25′—30′	Pk. W.	March	Outer hills
Mimosa.						
pudica, *L*	1	Sh.	2′	Pk.	April	Kota Dún
rubricaulis, *Lam.*	2	Sh.	6′—10′	R.	June	Ramgarh valley, &c.
Acacia.						
Farnesiana, *Willd.*	2	Sh.	10′	Y.	June	Almora
eburnea, *Willd.*	3	Tr.	15′	Wh.	January	Bhábar
Catechu, *Willd.*	1	Tr.	20′—30′	...	January	Bhábar
Intsia, *Willd.*	4, 5	Tr. or S. sc.	20′—30′	Y.	July	Bhábar, Bágesar.
Albizzia.						
Lebbek, *Benth.*	3, 4	Tr.	20′—30′	Y.	May	Bágesar, Bhábar.
Julibrissin, *Durazz.*	...	...	...	...	...	...
var. mollis.	2	Tr.	25′	W.	May	Naini Tál, &c.,
stipulata, *Boiv.*	1	Tr.	30′—40′	Y.	May	Outer hills, Balsani.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Forest	1—3,000	R.	...	...	
Shade	1—4,000	R.	...	...	
Do.	1—2,500	R.	...	...	Not found in Herb. S & W.
Open	1—4,000	R.	...	..	
Do.	1—4,000	R.	...	...	
...	..	..	...	..	
Do.	4—5,000	R.	...	...	
Cultivated	2,000	R	...	...	=*Jonesia Asoca* in Herb. S. & W.
Forest	1,000	R.	..	.	
Do.	1,000	R.	.	...	= *Piliostigma malabaricum* in Herb. S. & W.
Woods	1—3,500	R.	...	...	= *Phanera retusa* in Herb S. & W.
Forest	1 - 3,000	R.	...	...	= *Phanera Vahlii* in Herb. S. & W The flowers of this species are usually yellowish white. J. F. D.
Woods	3—4,000	R.	...	...	= *Phanera variegata* in Herb. S. & W
Cultivated	2,000	R.	...		Not found in Herb. S. & W.
Open	1—5,000	R.	..	...	
Gardens	5,500	R.	...	...	Not found in Herb. S.
Forest	1—2,000	R.	...	...	
Do.	1—2,500	R.	...	...	Not found in Herb. S. & W.
Do.	1—3,000	R.	...	...	
Do.	1—3,000	R.	...	...	No. 3 not found in Herb S. & W.
...	...	...	...	...	
Do.	5—7,000	R.	...	...	Not found in Herb. S & W.
Do.	2—7,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom)	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
ROSACEÆ.						
Prunus.						
persica, *Benth. & Hook.*	...	Sh.	...	...	March	Almora
armeniaca, *L.*	...	Sh.	...	...	March	Do.
Jacquemonntii, *Hook. f.*	...	Sh.	5'	...	June	Niti
Puddum, *Roxb.*	...	Tr.	20'	Pk.	November,	Almora, &c.
Padus, *L.*	...	Tr.	30'—50'	Wh.	April	Naini Tál, Dwáli, &c.
nepalensis, *Ser.*	...	Sh.	10'—15'	Wh.	April	Chaur
undulata, *Ham.*	...	Tr.	20'—30'	...	April	Naini Tál, Binsar.
Prinsepia.						
utilis, *Royle*	...	Sh.	6'	Wh.	January	Almora, &c.
Spiræa.						
vestita, *Wall.*	5	H.	2'—3'	Wh.	August	Bálam, &c
sorbifolia, *L.*	4	Sh.	10'—10'	Wh.	June	Dwáli, Niti
bella, *Sims.*	1	Sh.	6'	Pk.	May	Kathi Pass, Chechanickhal.
canescens, *Don.*	2	Sh.	10'—15'	Wh.	May	Common
vaccinifolia, *Don.*	3	Sh	6'	Wh.	June	Almora, &c.
Rubus.						
paniculatus, *Sm.*	9	Sh.	10'	Wh.	May	Tola (Sarju valley).
reticulatus, *Wall.*	8	Sh.	10'	Wh.	June	Láhúr, Dwáli
lanatus, *Wall.*	10	Sh.	15'	Wh.	April	Gagar, Binsar,
alpestris, *Bl.*	17	Sh.	...	...	...	Tungnáth
saxatilis, *L.*	5	Sh.	1'	...	July	Martoli
reptans, *Wall.*	6	S. cr.	1'—3'	Wh.	May	Láhúr
niveus, *Wall.*	4, 7	Sh.	10'—12'	Pk.	June	Namik, Ramri, Rur Pass.
macilentus, *Camb.*	1	Sh.	10'	Wh.	May	Binsar, Mádhári Pass.
ellipticus, *Sm.*	11, 12	Sh.	6'—8'	Wh.	April-May,	Outer hills, Binsar, &c.
biflorus, *Ham.*	13, 15	Sh.	6'—8'	Wh.	April	Naini Tál, Binsar, &c.
lasiocarpus, *Sm.*	8, 14	S. cr.	6'—12'	R. Pk.	May-February.	Kota Dún, Naini Tál, Binsar, &c.
var. membranaceus	13	Sh.	6'	Wh.	June	Chiring Pass

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himalaya. Rainy.	Himalaya. Dry.	Tibet.	Remarks.
Cultivated ...	1—5,000	R.	...	...	= *Persica vulgaris* in list. Not found in Herb. S. & W.
Do. ...	5,000	R	...	...	= *Armeniaca vulgaris* in list. Not found in Herb. S. & W.
Open ...	11,500	..	D	...	= *Cerasus* No. 5 in Herb. S. & W.
Do. ...	2, 5—6,000	R.	...	...	= *Cerasus* No 4 in Herb. S. & W.
Forest ...	7,500—11,000	R.	...	...	= *Cerasus* No. 1 in Herb. S. & W.
Open ...	6,000	R.	...	...	= *Cerasus* No. 3 in Herb. S. & W.
Forest ...	7—7,500	R.	...	...	= *Rhamnus* No. 5 in Herb. S. & W.
Open ...	3—8,000	R.	D.	..	
Do. ...	9—12,000	R.	D.	...	
By streams ...	7—12,000	R.	D.	...	
Forest ...	9—10,000	R	...	...	Not found in Herb. S. & W.
Open ...	5—7,500	R.	...	...	
Do. ...	7, 5—6,000	R.	...	...	
Do. ...	6,500	R.	...	...	
Woods ...	7—8,000	R	...	...	
Open ..	6—8,000	R.	...	...	
Woods ...	7,500	R.	...	...	
Open ..	11,000	..	D	...	
Open ...	7, 500—10,000	R.	..	...	
Forest & open,	8—10,700	R.	...	...	
Woods ..	7—8,000	R.	...	...	
Woods & open,	4—7,500	R.	...	...	
Woods ..	7—7,500	R.	...	..	
Do. ...	1, 5—7,000	R.	...	...	
Woods ...	7,500	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
rosæfolius, *Sm.* ..	2	Sh	10′	Wh.	May ..	Naini Tál ...
parvifolius, *L.* ...	16	Sh.	8′	Pk.	April ..	Naini Tál, Binsar.
Geum.						
urbanum, *L.* ...	...	H.	2′–3′	Y.	June ..	Námik, &c. ..
elatum, *Wall.* ..	...	H.	9″	Y.	June ..	Pathar, Kori ...
Fragaria.						
indica, *Andr.* ...	3	H.	3″–4	Y.	April ...	Outer hills .
vesca, *L.* ..	1	H.	2″–3′	Wh.	May ..	Pindari Rogila,
var. nubicola ...	2	H.	3″ 4″	Wh.	May ..	Naini Tál, Dwali.
Potentilla.						
purpurea, *Royle* ..	...	H.	2′	Pr.	August ...	Barjikang, &c.,
albifolia, *Wall.* ..	..	H.	4″–12″	Y.	May ..	Námik, Rálam,
procumbens, *L.* ..	...	H.	3″–9″	Y.	July .	Mádhari Pass, Rálam, &c
fruticosa, *L.* ..	1, 2, 2½, & 3.	Sh.	4″–3½′	Y.	August ...	Milam, Niti, Pitti and Gori rivers, Pindari, &c.
ambigua, *Camb.* ..	5	H.	4″	Y.	August	Rálam, Milam,
eriocarpa, *Wall.* ..	4	Sh.	1′	Y.	August .	Pindari, Singjari
Mooniana, *Wight* ...	14	H.	1′–3½′	Y.	August .	Kalimundi, Rálam.
fulgens, *Wall.* ...	13	H.	1′	Y.	July ..	Naini Tál, Binsar, &c.
Leschenaultiana, *Ser.*	9, 20	H.	9″–2′	Y.	March-August.	Naini Tál ...
var. bannehalensis;	15, 16	H.	2′–3′	Wh.	August ...	Jalat, Tola (Gori valley),
peduncularis, *Don.* ..	...	..	...	...	...	...
var. obscura, ..	17	H.	1′	Y.	July ..	Rálam ..
leuconota, *Don.* ..	29	H.	1′	Y.	June ...	Rálam, Dudatoli.
microphylla, *Don.* ..	19	H.	1″–2″	Y.	July ..	Barjikang, &c.
var. commutata ...	18	H.	3″–4″	Y.	July ...	Do. ...
bifurca, *D.* ..	27	H.	2″–3″	Y.	July ...	Milam, Gugé,
multifida, *L.* ...	22, 23	H.	3″–12″	Y.	July ...	Niti pass, Hoti, &c.
var. Saundersoniana,	23 (in part).	H.	...	Y.	July ...	Do. ...
sericea, *L.* ...	21	H.	3″–9″	Y.	July ..	Malari, Gugé ..
nepalensis, *Hook.* ...	10	H.	1′	R.	April ...	Naini Tál, Binsar, &c.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*			Remarks.
		Rainy.	Dry.	Tibet.	
Woods ..	7,000	R.	...	...	
Do. ...	7,500	R.	...	...	
Do. ..	7—11,000	R.	...	...	
Open ..	10—11,500	R.	...	...	= *Sieversia elata* in Herb, S. & W.
Do. ..	3—7,500	R.	...	...	
Do. ...	11—12,500	R.	...	...	
Open or woods,	8—10,500	R.	...	...	
Open ...	11—14,500	R.	D.	...	= *Sibbaldia* No. 4 in Herb S. & W.
Do. ..	8, 5—12,000	R.	...	...	= *Sibbaldia* No. 1 in Herb S. & W.
Do. ..	9, 5—14,000	R.	D.	...	= *Sibbaldia* No. 3 in Herb. S. & W.
Open, rocky places.	8—16,300	R.	D.	T.	
Open ..	11—15,000	R.	D.	T.	
Open rocks ..	9—12,000	R.	...	...	
Open ..	9—11,500	R	...	...	
Do. ..	6—10,000	R.	...	...	
Do. ...	6—7,000	R.	...	...	
Do. ...	6—11,500	R.	D.	...	
...	...	...	...	...	
Do. ...	13,000	R.	...	...	
Do. ..	10—12,000	R.	...	...	= *Sibbaldia* No. 2 in Herb. S. & W.
Do. ...	10—14,500	R.	...	...	
Do. ..	10—14,500	R.	...	...	
Do. ...	12—16,000	...	D.	T.	
Do. ...	15—17,000	...	...	T.	
Do. ...	Ditto	...	...	T.	
Do. ...	10—15,500	...	D.	T.	
Do. ...	7—8,500	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
argyrophylla, *Wall.* ..	7	H.	2′—4′	Or.	August ...	Sába, Rálam ...
var. atrosanguinea,	8	H.	2′—3′	R. Or.	August ..	Barjikáng, Pindari, &c.
„ leucochroa ...	6	H.	9″—13″	Y.	August ...	Barjikáng, &c.
monanthes, *Lindl.* ...	12, 25	H.	1½″—3″	Y.	August ...	Rálam, Barjikang
var. —— ...	26	H.	1″—2″	Y.	May ...	Champwa ...
Kleiniana, *W. & A.* ...	11	H.	1′	Y.	March ..	Naini-Tál, Binsar, Almora.
supina, *L.* ...	26	H.	3″—4″	Y.	January ...	Hardwár, Binsar.
8. Chamœrhodos.						
sabulosa, *Bunge.* ...	...	H.	2″	Wh.	September,	Gugé ...
9. Agrimonia.						
Eupatorium, *L.* ...	...	H.	2″—3″	Y.	June ...	Naini-Tál ...
10. Rosa.						
macrophylla, *Lindl.* ...	2, 3, & 7	Sh.	6′—10′	R.	June-July,	Rálam, Binsar, Tola, Chechani-Khál, &c.
Webbianna, *Wall.* ...	6	Sh.	6′	R.	July ...	Níti ..
sericea, *Lindl.* ...	4, 5	Sh.	6′—8′	W. Y.	May-July,	Káthi, Milam, Níti, &c.
moschata, *Mill.* ...	1	S. sc.	10′—30′	Wh.	April ...	Naini-Tál, Almora.
11. Cydonia.						
vulgaris, *Pers.* ...	...	Tr.	20′	...	March ...	Almora ...
12. Pyrus.						
baccata, *L.* ...	7	Tr.	20′	Wh.	April ...	Naini-Tál, Níti,
kumaoni, *Dcne.* ...	6	Tr.	25′	Wh.	March ...	Outer hills ...
lanata, *Don.* ...	3	Tr.	40′	Wh.	May ...	Mádhári Pass, &c.
vestita, *Wall.* ...	2	Tr.	40′	Wh.	May ...	Ditto ...
Aucuparia, *Gærtn.* ...	5	Tr.	20′	Wh.	June ...	Milam ...
foliolosa, *Wall.* ...	4	Tr.	25′	Wh.	May ...	Dwáli ...
13. Stransvæsia.						
glaucescens, *Lindl.* ...	...	Tr.	30′	Wh.	May ...	Outer hill ...
14. Cratægus.						
crenulata, *Roxb.* ...	...	Sh.	12′	Wh.	April ...	Ditto.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himâlaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	9—11,000	R.	.	...	
Do. ...	11—14,00	R.	D.	...	
Do. ..	12—15,000	R.	D.	...	
Do. ...	12—14,500	R.	...	...	
Rocks ...	12,000	R.	...	...	
Open ...	5—7,000	R	...	..	
Do. ...	1—7,000	R.	...	...	
Do. ..	15,000	...	...	T.	
Woods ...	7,500	R.	...	...	
Open woods ...	7—12,000	R.	D.	...	
Do. ...	9—11,500	...	D.	..	
Do. ...	8—13,000	R.	D.	...	
Open ...	2, 5—8,500	R.	..	...	
Cultivated ..	5,000	R.	...	...	Not found in Herb. S. & W.
Open woods ...	6—11,500	R.	D.	...	
Open ...	2, 5—8,000	R.	...	...	
Forest ...	9—10,000	R.	...	...	
Do. ...	8—10,000	R.	...	...	
Open ...	12,000	..	D.	..	
Forest ...	9—12,000	R.	...	...	
Woods ...	3—7,000	R.	...	...	=Pyrus No. 1, in Herb. S. & W.
Open woods ...	2,5—7,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
15. Cotoneaster.						
bacillaris, *Wall.* ...	1	Sh.	15'	Wh.	May ...	Naini Tál, Binsar.
acuminata, *Lindl.* ...	2, 3	Sh.	15'	Pk.	May ...	Káthi ...
multiflora, *Bunge* ...	6	Sh.	5'	Pk.	July ...	Niti ...
microphylla, *Wall.*	4	Sh.	2'	Wh.	April ...	Naini Tál, Milam.
var. —— ..	5	Sh.	1'	Wh.	May ..	Pindari ...
XL.—SAXIFRAGACEÆ.						
1. Astilbe.						
rivularis, *Ham.* ..	...	H.	5'	Wh.	July ...	Naini Tál ...
2. Saxifraga						
sibirica, *L.* .	5	H.	6"	Wh.	August ..	Rálam ...
cernua, *L.*	6	H.	4"	Wh.	August ...	Barjikáng ...
palpebrata, *Hf.* & *T.*	18	H.	2"	Y.	August ..	Rálam ...
Lychnitis *Hf.* & *T.*	14	H.	1"	Y.	August	Barjikáng ...
saginoides, *Hf.* & *T.*	15	H.	1"—2"	Or.	August ...	Rálam ...
Hirculus, *L.* ...	...	.	...	...	.	...
var. hirculoides ...	17	H.	2"—3"	Y.	August ...	Barjikáng and Balch Passes.
diversifolia, *Wall.* ..	2½, 3, 4	H.	12"—15"	Y.	August ..	Barjikáng Pass, Kalimundi.
pallida, *Wall.* ...	16	H.	3"	Pk.	August ...	Barjikáng ...
microphylla, *Royle* ...	24	H.	...	Gr.	August ...	Chorhoti Pass, Barjikáng Pass.
Jacquemontiana, *Dcne.*	13	H.	½"—1"	Y.	July ...	Rálam, Chorhoti Pass
var. Stella-aurea ..	12	H.	½"	Y.	July ...	Barjikáng, Chorhoti Pass.
ramulosa, *Wall.* ..	8, 9, 10	H.	1"—6"	Pk. Gr. Y. Wh.	May, June,	Namik, Rogila, Pindari, Rákastál.
fimbriata, *Wall.* ..	19	H.	4"—6"	Y.	August ...	Rálam ...
filicaulis, *Wall.* ...	7	H.	4"	Y.	August ...	Badárinath ...
Brunoniana, *Wall* ...	20	H.	3"—4"	Y.	August ...	Naini Tál, Saba,
flagellaris, *Willd.* ...	21, 22, 23	H.	½"—4"	Y.	August ..	Barjikáng, Lanjar, Milam.
ligulata, *Wall.* ...	...	...	...	...	...	...
var. ciliata. ...	1	H.	6"	Pk.	February,	Bagesar, Almora, &c. ...
Stracheyi, *Hf.* & *T.*	2	H.	6"	Pk.	June ...	Milam ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.* Rainy.	*Himálaya.* Dry.	Tibet.	Remarks.
Woods ...	6,5—9,000	R.	...	...	
Woods ...	7,5—9,000	R.	...	...	No. 2 not found in Herb. S. & W.
Open ...	11,500	...	D.	...	
Do. ...	7—11,500	R.	D.	...	
Do. ...	12,500	R.	...	...	
Woods ...	6—7,000	R.	...	...	
Open ...	11,5—14,500	R.	...	...	
Do. ...	14,500	R.	...	...	
Do. ...	12,000	R.	...	...	
Do. ...	14,500	R.	...	...	
Do. ...	13,000	R.	...	...	
...					
Do. ...	13—17,000	R.	D.	T.	
Do. ...	7—13,000	R.	...	...	
Do. ...	14,500	R.	...	...	
Do. ...	14,500	R.	...	...	
Do. ...	13—16,000	R.	D.	T.	
Do. ...	14—16,000	R.	D.	T.	
Shady rocks & open.	8,5—15,500	R.	D.	T.	
Open ...	11,500	R.	...	...	
Do. ...	10,000	R.	D.	...	
Shady rocks ...	7—9,000	R.	...	...	
Open ...	13—17,000	R.	D.	T.	
...	...	R.	...	...	
Shady rocks ...	3—10,000	R.	...	...	
Open ...	11—12,000	...	D.	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
3. Chrysosplenium.						
trichospermum, *Edgw.*	2	H.	6"	Gr.	May ...	Dwáli, Mádhári Pass.
tenellum, *Hf. & T.*	1	H.	¼" 1"	Gr.	May ...	Mádhári Pass,
4. Parnassia.						
nubicola, *Wall.* ..	1	H.	8" 12"	Wh.	July ...	Naini Tál, &c.
ovata, *Ledeb.* ..	3	H.	2" 3"	Wh.	August ...	Rajhoti, Tisum,
pusilla, *Wall.* ..	2	H.	2"	Wh.	August ...	Barjikáng Pass.
5. Hydrangea.						
altissima, *Wall.* ...	1	S. sc.	30—40	Gr. W.	May ...	Darki-binaik, &c.
aspera, *Don.* ...	3	Tr.	20′	...	...	Tola (Sarju valley).
vestita, *Wall.* ...	2	Tr.	10′—20′	Gr. W.	July ...	Rámni, Dwáli
6. Deutzia.						
corymbosa, *Br.* ...	1	Sh.	15′	Y. Wh.	May ...	Namik, Binsar, &c.
staminea, *Br.* ...	2	Sh.	10′	Y. Wh.	May ...	Common ...
macranthus, *Hf. & T.*	3	Sh.	10′	Y. Wh.	May ...	Binsar ...
7. Philadelphus.						
coronarius, *L.* ...	...	Sh.	12′	Wh.	May ...	Káthi, &c. ...
8. Itea.						
nutans, *Royle* ...	...	T.	15′	Wh.	May ...	Bágesar, outer hills.
9. Ribes.						
Grossularia, *L.* ...	1	Sh.	8′	Gr.	June ...	Tola, Milam ...
orientale, *Poir.* ...	2	Sh.	6′	...	June ...	Milári, Niti ...
glaciale, *Wall.* ...	3, 5	Sh.	6′—15′	...	May ...	Milam Pindari, Láhúr, Dwáli.
ubrum, *L.* ...	4	Sh.	15′	...	May ...	Dwáli, Rámni,
XLI.—CRASSULACEÆ.						
1. Tillæa.						
pentandra, *Royle* ...	...	H.	2"—3"	Gr. Y.	July ...	Naini Tál, Almora.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himálaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Wet banks ...	7—8,000	R.	...	...	
Do. ...	10,000	R.	...	...	
Open wet ...	7 5—9,000	R.	...	...	
Do. ...	15,000	...	...	T.	
Do. ...	14,500	R.	...	...	
Forest ...	7,500	R.	...	...	
Do. ...	6,500	R.	...	...	
Do. ...	8—11,000	R.	...	...	
Do. ...	7—8,000	R.	...	...	
Do. ...	5—7,500	R.	...	...	
Do. ...	5,500	R.	...	...	
Do. ...	7—8,000	R.	...	...	
Do. ...	3—4,000	R.	...	...	
Open ...	11,500	...	D.	...	
Do. ...	10—11,500	...	D.	...	
Open and on trees.	7—12,000	R.	D.	...	
Open woods ...	8—10,000	R.	...	...	
Wet banks ...	5—8,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
2. Crassula.						
indica, *Dcne.* ...	1	H.	8"	Gr. W.	July ..	Gagar, Paton,
3. Kalanchoe.						
spathulata, *DC.* ...	...	H.	2'—3	Y.	August ...	Almora, &c. ...
4. Cotyledon.						
Oreades, *C. B. Clarke*,	...	H.	1"—2"	Y.	July ...	Ráiam, Shelong.
5. Sedum.						
Rhodiola, *DC.* ...	11	H.	1'—1½'	Gr. Y.	July ...	Pindari, Singjari.
crenulatum, *Hf. & T.*	12, 16,	H.	2"—9"	...	...	Niti Pass, &c.,
quadrifidum, *Pall.* ...	17, 19	H.	2"—3"	R.	June, August	Patharkor, Pindari, Rákas tál, Rajhoti.
Himalense, *Don.* ...	20	H.	...	...	...	?
elongatum, *Wall.* ...	10	H.	8"	...	August ...	Sába ...
fastigiatum, *Hook f.*	18	H.	4'	Y.	July ...	Niti valleys in Gugé.
asiaticum, *DC.* ...	13	H.	6"—12"	Y.	July ...	Champwa, Barjikáng.
var. Wallichianum,	14	H.	6"	...	August ...	Milam ...
linearifolium, *Royle*,	8	H.	4"—6"	Y. Wh.	August ...	Rálam, Hardol Pass.
trifidum, *Wall.* ...	7	H.	6"	Wh.	August ...	Naini Tal, Gori valleys, &c.
rosulatum, *Edgew.* ...	1	H.	2"	W. Gr.	April ...	Naini Tál, &c.,
adenotrichum, *Wall.*	4	H.	4"	...	...	?
trullipetalum, *Hf. & T.*	21	H.	2"	Y.	August ...	Barjikáng, Milam.
Ewersii, *Ledeb* ...	9	H.	6"—9"	R.	August ...	Milam, Niti, Gugé
multicaule, *Wall.* ...	3, 6,	H.	1"—6"	R. Y.	March, August.	Almora, Naini Tál, Gori valley.
6. Sempervivum.						
acuminatum, *Dcne.* ...	3	H.	4"—5"	...	...	Plains of Gugé.
mucronatum, *Edgew.*	1	H.	6"	...	August ...	Malári, ...
XLII.—DROSERACEÆ.						
1. Drosera.						
peltata, *S.M.* ...	..	H.	8"	Wh.	July ...	Almora, Jágesar.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open rocks ...	5—7,500	R.	...	...	
Open ...	4—5,000	R.	...	...	
Do. ...	11—15,500	R.	D.	...	= *Sedum* No. 2, in Herb. S. & W.
Do. ...	11,000	R.	...	...	
Do. ...	14—17,000	R.	D.	T.	
Do. ...	10—16,000	R.	...	T.	
...	?	...	...	...	
Woods ...	9,000	R.	...	...	
Open ...	11—15,000	...	D.	T.	
Do. ...	12—14,500	R.	...	...	= *S. Rhodiola* in part.
Do. ...	11,500	..	D.	...	
Do. ...	9—12,000	R.	...	...	
On trees ...	7—8,500	R.	...	...	
Banks ...	6—7,000	R.	...	...	
...	?	R.	...	...	
Rocks ...	12—14,000	...	D.	...	
Open ...	11—15,500	...	D.	T.	
Open wet ..	6—7,000	R.	...	...	
Open ...	15,500	...	...	T.	= *Crassula* No. 2 in Herb. S. & W.
Do. ...	10.500	...	D.	...	
Open wet ...	4—6,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
XLIII.—HALORAGEÆ.						
1. Hippuris.						
vulgaris, *L.*	...	H.	1′—1½′	Gr.	July	Raj-hoti, Gyanyima.
2. Myriophyllum.						
spicatum, *L.*	...	H.	1′—2′	...	...	Naini Tál, &c.
XLIV.—COMBRETACEÆ.						
1. Terminalia.						
belerica, *Roxb.*	4	Tr.	30′	...	...	Bhábar
Chebula, *Retz.*	1	Tr.	30′	Wh.	May	Sarju valley
tomentosa, *Bedd.*	...	Tr.	30′	V. Gr.	August	Sarju valley
2. Anogeissus.						
latifolia, *Wall.*	...	Tr.	20′	...	August	Bhábar
3. Combretum.						
nanum, *Ham.*	...	S. H.	1′—2′	Wh.	April	Bágesar Ganánáth
XLV.—MYRTACEÆ.						
1. Psidium.						
Guyava, *L.*	...	Tr.	10′—15′	...	February,	Outer hills
2. Eugenia.						
Jambolana, *Lam.*	1	Tr.	30′	Wh.	March	Bhábar, outer hills.
sp—	2	Tr.	30′—40′	Wh.	December,	Ditto.
3. Careya.						
arborea, *Roxb.*	...	Tr.	30′	...	...	Bhábar
XLVI.—MELASTOMACEÆ.						
1 Osbeckia.						
chinensis, *L.*	1	H.	2′	Pk.	September,	Bageser, &c.
stellata, *Wall.*	2	Sh.	3′	Pk.	August	Common

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himálaya. Rainy.	Himálaya. Dry.	Tibet.	Remarks.
In water ...	15,000	...	...	T.	
Do. ...	4—6,500	R.	...	...	
Forest ...	1,000	R.	...	...	Not found in Herb. S. & W.
Do. ...	3,500	R.	...	...	
Do. ...	2,500	R.	...	...	=*Pentaptera* No. 1 in Herb. S. & W.
Do. ...	1—2,000	R.	...	...	=*Conocarpus latifolia* in Herb. S. & W.
Open ...	3—6,000	R.	...	...	
Cultivated ...	1—5,000	R.	...	...	
Forest ...	1—3,000	R.	...	...	=*Syzygium Jambolanum* in Herb. S. & W.
Do. ...	1—2,000	R.	...	...	=*S. venosum*, *DC.* in Herb. S. & W.
Do. ...	1—2,000	R.	...	...	
Open ...	3—5,000	R.	...	...	
Do. ...	4—6,500	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
XLVII.—LYTHRACEÆ.						
1. Ammannia.						
rotundifolia, *Ham.* ...	...	H.	3″—4″	Pk.	February,	Almora ...
salicifolia, *Monti.* ...	2, 3	H.	12″	...	...	Kosi river, Almora.
2. Woodfordia.						
floribunda, *Salisb.* ...	...	Sh.	8′—10′	Sc.	February,	Outer hills ...
3. Lagerstrœmia.						
parviflora, *Roxb.* ...	...	Tr.	40′—50′	Wh.	...	Bhábar ...
4. Punica.						
Granatum, *L.* ...	...	Sh.	8′—10	Sc.	June ...	Outer hills ...
XLVIII.—ONAGRACEÆ.						
1. Epilobium.						
angustifolium, *L.* ...	2	H.	3′	Pk.	August ...	Níti, Rimkim,
latifolium, *L.* ...	1	H.	9″	Pr.	August ...	Milam, Badarináth.
hirsutum, *L.* ...	10	H.	3′	...	...	Naini Tál ...
var. lætum. ...	14	H.	...	...	...	Almora ...
roseum, *Schreb.* ...	5, 7, 9 11, 12, 13	H.	...	...	...	...
var. cylindricum ...	8	H.	...	...	...	Naini Tál ...
palustre, *L.* ...	4	H.	4″	Pk.	August ...	Laptel ...
origanifolium, *Lam.* ...	6	H.	4″	Pk.	August ...	Milam ...
2. Circæa.						
lutetiana, *L.* ...	3	H.	8″	Wh.	July ...	Binsar ...
cordata, *Royle* ...	1	H.	1′—2′	Wh.	August ...	Naini Tál, Kálimundi, &c.
alpina, *L.* ...	2	H.	4″	Wh.	August ...	Sába ...
XLIX.—SAMYDACEÆ.						
1. Casearia.						
tomentosa, *Roxb.* ...	...	T.	25′	GY.	February,	Bhábar ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	4—5,500	R.	...	...	=*Ameletia rotundifolia* in Herb. S. & W.
Open and by water.	4,000	R.	...	...	No. 3 not found in Herb. S. & W.
Open ...	3—6,000	R.	...	...	=*Grislea tomentosa* in Herb. S. & W.
Forest ...	1,000	R.	...	...	
Open woods, cultivated.	1—5,500	R.	...	...	
Open ...	11,5—13,500	...	D.	T.	
Do. ...	11,5—14,000	...	D.	...	
Woods ...	6,500	R.	...	...	
Open ...	5,000	R.	...	...	
...	...	...	...	...	
Woods ...	6,500	R.	...	...	
Open ...	15,000	...	...	T.	
Do. ...	13,000	...	D.	...	
Forest ...	7,000	R.	...	...	
Do. ...	7—8,000	R.	...	...	
Do. ...	9,000	R	...	...	
Do. ...	1—2,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
L.—CUCURBITACEÆ.						
1. Trichosanthes.						
palmata, *Roxb.*	...	H. sc.	10'	Wh.	July	Sarju valley, &c.
2. Herpestospermum.						
caudigerum, *Wall.*	...	H. sc.	6'	Y.	August	Kalimundi Pass.
3. Cucumis.						
sativus, *L.*	1	H. sc.	1'	Y.	August	Jalat ...
4. Zehneria.						
umbellata, Thun.	...	...	...	...	...	...
var. nepalensis	...	H. sc.	6'	Wh.	May	Sarju valley ...
5. Melothria.						
odorata, *Hf. & T.*	...	H. sc.	10'	Y.	July	Almora ...
6. Gomphogyne.						
cissiformis, *Griff.*	...	H. sc.	6'	Gr. Y.	August	Kálimundi Pass
7. Gynostemma.						
pedata, *Bl.*	...	H. sc	...	...	...	?
LI.—BEGONIACEÆ.						
1. Begonia.						
picta, *Sm.*	2	H.	8"	Pk.	August	Outer hills. ...
amœna, *Wall.*	1	H.	6"	Pk.	August	Naini Tál, Dágesar, &c.
LII.—DATISCACEÆ.						
1. Datisca.						
cannabina, *L.*	...	H.	7	...	July	Almora ...
LIII.—FICOIDEÆ.						
1. Mollugo.						
stricta, *L.*	...	H.	4"	Wh.	July	Naini Tál, &c.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.* Rainy.	Dry.	Tibet.	Remarks.
Open ...	4,500	R.	...	...	
Do. ...	8,500	R.	...	...	=*Gymnopetalum pedunculosum* in Herb. S. & W.
Do. ...	5,000	R.	...	...	
...	...	...	...	...	
Do. ...	6,500	R.	...	...	=*Karivia umbellata* in Herb. S. & W.
Do. ...	5,000	R.	...	...	
Do. ...	5—8,000	R.	...	...	
...	?	...	...	...	=*Eukylia trigyna* in Herb. S. & W.
Wet banks ...	4—6,000	R.	...	...	
Trees & rocks,	7,000	R.	...	...	
River-bed ...	4,000	R.	...	...	
Open ...	4—7,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
LIV.—UMBELLIFERÆ.						
1. Hydrocotyle.						
javanica, *Thnb.* ...	1	H, cr.	6″	...	March ...	Gágar, Almora,
rotundifolia, *Roxb.* ...	3	H.	3″	...	...	?
asiatica, *L.* ..	2	H. cr.	6″	...	March ...	Kota-Dún, &c.
2. Sanicula.						
europæa, *L.* ...	...	H.	1′–1½′	...	May ..	Karim, Naini Tál, &c.
3. Vicatia.						
coniifolia, *DC.* ...	1, 2	H.	6″—1½′	...	May ...	Chaur, Láhur...
4. Trachydium						
Roylei, *Lindl.* ...	...	H.	4″	Wh.	September,	Lanjar ...
5. Bupleurum.						
lanceolatum, *Wall.* ...	4	H.	3′—4′	Wh.	May ...	Karim ...
Candollii, *Wall.* ...	2	H.	2′	Br.	August ...	Rálam ...
falcatum, *L.* ...	6	H.	3′—4′	...	February.	Outer hills ...
var. marginata ...	1	H.	2′–3′	Y.	May, ...	Sarju valley ...
longicaule, *Wall.* ...	3	H.	1′—2′	Br.	August ...	Rálam, Níti ...
tenue, *Don* ...	5	H.	2′—3′	...	September,	Naini Tál, Gágar
6. Carum.						
carui, *L.* ...	...	H.	2′	Wh.	July ...	Tola ...
anethifolium, *Benth.*	...	H.	12′	...	...	Naini Tál, Almora,
Falconeri, *C. B. Clarke.*	...	H.	2′—3′	...	September,	Binsar ...
7. Pimpinella.						
achilleifolia, *C. B. Clarke.*	...	H.	...	...	...	?
acuminata, *C. B. Clarke.*	...	H.	3′	Wh.	August ...	Naini Tál, &c.
tenera, *Benth.* ...	...	H.	1′—1½′	...	...	Naini Tál ...
diversifolia, *DC.* ...	1	H.	2′—4′	Wh.	August ...	Dudatoli, Naini Tál.
Stracheyi, *C. B. Clarke.*	2	H.	9″	Wh.	June ...	Dhaoli river ...
cæspitosa, *Benth.* ...	...	H.	3″—4″	Wh.	July ...	Níti ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
By water	5—6,500	R.	...	...	
...	?	...	...	...	
Open	2—4,000	...	...	...	
Woods.	3,5—7,000	R.	...	...	
Near water, open.	6—9,500	R.	...	...	
Open	16—17,500	...	...	T.	
Near water	6,500	R.	...	...	
Open	10,000	R.	...	...	
Do.	3—6,000	R.	...	...	
Do.	3,5—6,500	R.	...	...	
Do.	11—12,000	R.	D.	...	
Do.	2,5—7,000	R.	...	...	
Do.	11,500	..	D.	...	
Do.	5—6,500	R.	...	...	= *Ptychotis* No. 2 in Herb. S. & W.
Woods	7,000	R.	...	...	= *Ptychotis* No. 1 in Herb. S. & W.
...	?	.	...	...	= *Ptychotis* No. 3 in Herb. S. & W.
Woods	7,000	R.	...	...	= *Reutera acuminata* in Herb. S. & W.
On oaks	8 500	R.	...	...	= *Acronema tenerum*, not found in S. & W.
Woods	5—9.500	R.	...	...	
On rocks	7.500	R.	...	...	
On rocks	12,000	R.	D.	...	= *Petrosciadium caespitosum* in Herb. S. & W.

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
8. Osmorrhiza.						
Claytoni, *C. B. Clarke.*	...	H.	1′—2′	...	May ...	Láhur ...
9. Chærophyllum.						
reflexum, *Lindl.* ...	...	H.	2′—3′	...	August ...	Jalat ...
10. Seseli.						
indicum, *W & A.* ...	...	H.	...	...	...	?
trilobum, *Benth.* ...	...	H.	2′—3′	Wh.	August ...	Milam, Níti ...
11. Œnanthe.						
stolonifera, *Wall.* ...	2	H.	2′	Wh.	August ...	Almora ...
12. Selinum.						
tenuifolium, *Wall.* ...	...	H.	1′—3′	Wh.	August ...	Naini Tál, Rálam, Milam.
var elata. ...	...	H.	1′—3′	Wh.	August ...	Naini Tál, Rálam, Milam.
vaginatum, *C. B. Clarke.*	...	H.	...	...	...	...
13. Cortia.						
Lindlei, *DC.* ...	1′2	H.	6″—9″	...	August ..	Rálam ...
14. Pleurospermum.						
Govanianum, *Benth*...	7 ?	H.	2′	Wh.	August ...	Rálam valley.
Candollii, *Benth.* ...	3	H.	12″	Wh.	August ...	Milam, Kalajawar
angelicoides, *Benth.* ...	...	H.	5′	Wh.	August ...	Rálam valley.
dentatum, *Benth.* ...	...	H.	...	...	...	?
stellatum, *Benth.* ...	...	H.	6″	Wh.	September.	Milam ...
Hookeri, *C. B. Clarke.*	...	H.	9″	Wh.	August ...	Shelshel Rákastal.
Brunonis, *Benth.* ...	...	H.	9″	Wh.	August ...	Milam, Kálájawar.
15. Peucedanum.						
Dhana, *Ham.* ...	6	H.	...	...	...	Almora ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.* Rainy.	*Himálaya.* Dry.	Tibet.	Remarks.
Woods ...	7,500	R.	...	...	
Open ...	5,000	R.	...	...	
...	?	...	...	...	=*Cnidium diffusum* in Herb. S. & W.
Open ...	11.500	...	D.	...	=*Eriocycla nuda* in Herb. S. & W.
Near water ...	4.000	R.	...	...	Not found in Herb. S. & W.
Open ...	5,5—12,500	R.	D.	...	=*Peucedanum* Nos. 2 and 4 in Herb. S. and W.
Do. ...	5,5—12,500	R.	D.	...	=*Selinum* No. 1 & *Peucedanum* No. 3.
...	...	...	...	...	=*Peucedanum* No. 5 in Herb S. & W.
	12,500—14,500	R.	...	...	
...					
Open ...	8—11,000	R.	...	...	
Do. ...	12—14,000	...	D.	...	=*Hymenolæna* No. 3 in Herb. S. & W.
Do. ...	8—11,000	R.	...	...	=*Angelica glauca* in Herb. S. & W.
...	?	...	...	...	=*Hymenolæna* No. 1 in Herb. S. & W.
Do. ...	13,000	...	D.	...	=*Hymenolæna* No. 6 in Herb. S. & W.
Do. ...	15,500	...	...	T.	=*Hymenolæna* No. 4 and Oreocome 2 in Herb. S. & W.
Do. ...	11—14,000	...	D.	...	=*Hymenolæna* No. 2 in Herb. S. & W.
Do. ...	5—6,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
16. Heracleum.						
Brunonis, *Benth.* ...	...	H.	1'—1½'	Wh.	August ...	Rálam, Milám,
candicans, *Wall.* ...	1, 2, 3	H.	3'	Wh.	May ...	Naini Tál, Rálam.
17. Caucalis.						
Anthriscus, *Scop.* ...	...	H.	3'	R.	August ...	Naini Tál, Páton.
LV.—ARALIACEÆ.						
1. Aralia.						
cissifolia, *Griff.* ...	...	...	...	...	...	...
var. scandens ...	?	S. sc.	...	...	May ...	Dwáli, Mádhári Pass.
2. Pentapanax.						
Leschenaultii, *Seem.* ...	...	...	...	...	...	...
var. umbellatum ...	3	Sh.	20'	...	May ...	Mádhári Pass, Dwáli.
3 Heptapleurum.						
impressum, *C. B. Clarke.*	...	Tr.	25'—30'	...	September,	Chami-binaik,
venulosum, *Seem.* ...	...	S. sc	30'—40'	...	March ...	Outer hills ...
4. Heteropanax.						
fragrans, *Seem.* ...	...	Tr.	20'	...	December,	Bhábar ...
5. Brassiopsis.						
aculeata, *Seem.* ...	...	Tr.	4'—8'	Wh.	February,	Sarju valley ...
6. Macropanax.						
oreophilum, *Miq.* ...	...	Sh.	6'	...	...	Naini Tál ...
7. Hedera.						
Helix, *L.* ...	1	S. sc.	30'—40'	Wh.	October ...	Bágesar, Naini Tál.
LVI.—CORNACEÆ.						
1. Marlea.						
begoniæfolia, *Roxb.* ...	...	Tr.	20'	...	June ...	Páton, outer hills.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	13,500	R.	D.	...	= *Tordylopsis Brunonis* in Herb. S & W.
Do. ...	6—11,000	R.	..	...	
Do. ...	5, 5—6,500	R.	...	...	Probably = *Torilis Anthriscus* of list, which is not found in Herb. Strachey, though *Caucalis Anthriscus* is there, named in manuscript without a printed ticket.
...	...	...	...	...	
Forest ...	8,600	R.	...	...	
...	...	...	...	...	
Do. ...	8—10,000	R.	...	...	
Forest near water	10,000	R.	...	...	= *Hedera tomentosa* in Herb S. & W.
Forest ...	1—3,000	R.	...	...	= *Paratropia* and *Hedera* No. 4, in Herb. S. & W.
Do. ...	1,000	R.	...	...	= *Panax fragrans* in Herb. S. & W.
Do. ...	2, 5—4,000	R.	...	...	= *Hedera* No. 3 in Herb. S. & W.
Do. ...	6,500	R.	...	...	= *Hedera* No. 5 in Herb. S. & W.
Do. ...	3—9,000	R.	...	...	
Open ...	3—6,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
2. Cornus.						
macrophylla, *Wall.*	2	Tr.	30'—40'	Wh.	May	Naini Tál
oblonga, *Wall*	3	Sh.	15'—20'	Wh	October	Common
capitata, *Wall.*	...	Tr.	20'	Y.	June	Pyura, &c.
LVII.—CAPRIFOLIACEÆ.						
1. Viburnum.						
cotinifolium, *Don*	2	Sh.	15'	W. Pk	May	Naini Tál, Dwáli.
stellulatum, *Wall.*	5	Sh.	12'	Wh	Do.	Binsar, &c.
var. —	6	Sh.	15'	...	Do.	Dudatoli
" involucrata	7	Sh.	15'	Wh.	Do.	Káthi
punctatum, *Ham.*	3	Tr.	40'–50	Wh	Do.	Sarju valley
coriaceum, *Bl.*	8	Sh.	15'	Wh	July	Common
erubescens, *Wall.*	2	Sh.	15'	Wh. Pk.	May	Káthi, Láhur
nervosum, *Don*	4	Sh.	15'–20'	Pk.	Do.	Mádhári Pass, Pindari.
2. Triosteum.						
hirsutum, *Wall.*	...	Sh.	4'	...	July	Dugli
3. Abelia.						
triflora, *Br.*	...	Sh.	10'	Wh.	May	Naini Tál, Malári.
4. Lonicera.						
hispida, *Pall.*	11	Sh.	10'	Y.	June	Sagtea-deo Pass.
glauca, *Hf. & T.*	2	Sh.	2½'	Y.	July	Milam, Bompras.
asperifolia, *Hf. & T.*	6	Sh.	2½'—3'	Y.	Do.	Rimkim
angustifolia, *Wall.*	8?	Sh.	10'—12'	Pk. W.	May	Námik, Káthi,
rupicola, *Hf. & T.*	5	Sh.	2½'	Pk.	July	Rimkim
spinosa, *Jacquem.*	4	Sh.	2½'	Y.	Do.	Niti, Rimkim,
parvifolia, *Edgew.*	3	Sh.	2'	Y.	May	Pindari, Champwa.
obovata, *Royle*	1	Sh.	2'	Y.	July	Milam
quinquelocularis, *Hardw.*	9	Sh.	12'	Y.	May	Naini Tál, &c.,
hypoleuca, *Dcne.*	7	Sh.	5'-6'	Y.	June	Jelam
alpigena, *L.*	10	Sh	15'-20'	Y. Pk.	July	Námik, Milam,
sinensis, *Dcne.*	14	S. sc.	20'	...	June	Almora
5. Leycesteria.						
formosa, *Wall.*	...	Sh.	6'-8'	W. Pk.	May	Gágar. Binsar, &c.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himalaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Forest ...	5—7,500	R.	...	...	
Open & woods	4—7,000	R.	...	...	
Open ...	5—7,000	R.	...	...	=*Benthamia fragifera* in Herb. S. & W.
Forest ...	7—10,000	R.	...	...	
Do. ...	7 8,500	R.	...	...	
Do. ...	8—9,500	R	...	...	
Do. ..	7,500	R.	...	...	
Do. ...	4,000	R.	...	...	
Open and woods	5—8,500	R	...	...	
Forest ...	7—9,000	R.	...	...	
Do. ...	9,5—11,000	R.	...	...	
Open rocks ...	10,500	R.	...	...	
Woods ...	6,—10,500	R.	D.	...	
Open ...	11,000 -	R.	...	...	
Do. ...	12, 5—14,500	..	D.	...	
Do. ...	13,500	...	...	T.	
Forest ...	8—9,000	R.	...	...	
Open ...	13,500	...	.	T.	
Do. ...	11,5—13,500	...	D.	T.	
Do. ...	12,000	R.	...	...	
Do. ...	12,500	...	D.	...	
Open & woods,	3-7,000	R.	...	...	
Open ...	9,000	...	D.	...	
Open & woods.	8. 5-11,500	R.	D.	...	
Cultivated ...	5,500	R.	...	...	
Forest ...	7-9.000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flowers.	Time of flowering.	Locality.
LVIII.—RUBIACEÆ.						
1. Adina.						
cordifolia, *Hook. f.*	...	Tr.	60′	Wh.	January ...	Bhábar ...
2. Stephegyne.						
parvifolia, *Korth.*	...	Tr.	40′	Wh.	Do. ...	Do. ...
3. Uncaria.						
pilosa, *Roxb.*	...	Sh.	...	...	June ..	Sarju valley ...
4. Hymenopogon.						
parasiticus, *Wall.*	...	Sh. P.	1′-2′	Wh.	July ...	Binsar, &c. ..
5. Hymenodictyon.						
excelsum, *Wall.*	2	Tr. P.	30′	...	...	Kálápathar, &c.
flaccidum, *Wall.*	1	Tr. P.	20′	...	...	Mohargári ...
6. Wendlandia.						
exserta, *DC.*	1	Tr.	30′	Wh.	May ...	Bhábar, Bágesar.
tinctoria, *DC.*	2	Tr.	15′	Wh.	Do. ..	Bágesar ..
7 Argostemma.						
sarmentosum, *Wall.*	2	H.	3″	Wh.	August ..	Sarju valley ...
verticillatum, *Wall.*	1	H.	3″	Wh.	Do. ..	Do. ..
8. Clarkella.						
nana, *Hook. f.*	...	H.	2″—3″	Wh.	Do. ..	Mohargári ...
9. Hedyotis.						
stipulata, *Br.*	3	H.	12″	Wh.	Do. ...	Almora ...
10. Oldenlandia.						
Heynei, *Br.*	...	H.	4″	Wh.	Do. ...	Do. ...
gracilis, *DC.*	...	H.	6″—9″	Br.	April ...	Do. ...
coccinea, *Royle*		H.	6″—15″		July ..	Binsar ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.* Rainy.	*Himálaya.* Dry.	Tibet.	Remarks.
Forest	1,000	R.	...	...	=*Nauclea* No. 1 in Herb. S. & W.
Do.	1,000	R.	...	..	=*Nauclea* No. 2 in Herb. S. & W.
Do.	2,500	R.	...	..	
On trees	6-7,500	R.	.	..	
Forest	2,500	R	...	..	
Do.	4 000	R	...	...	
Do.	1-3,000	R.	...	...	
Do.	2-3,000	R.	...	...	
Wet banks	3—4,500	R.	...	..	
Do.	3—4,500	R	...	..	
Do.	4,000	R.	..	...	=*Ophiorrhiza* No. 2 in Herb. S. & W.
Near water	4,000	R.	...	...	
Open	5,500	R.	...	...	=*Hedyotis* No. 2 in Herb. S. & W.
Do.	4 5,500	R.	...	...	=*Kohautia* No. 1 in Herb. S. & W.
Open grass	7,000	R.	...	...	=*Kohautia* No. 2 in Herb. S. & W.

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
11. Anotis.						
calycina, *Wall.* ...	...	H.	3"—6"	Wh.	August ...	Naini Tál, &c.,
12. Ophiorrhiza.						
fasciculata, *Don* ...	...	H.	6"	Wh.	Do. ...	Mohargári ...
13. Adenosacme.						
longifolia, *Wall.* ...	...	H.	3'	Y.	Do. ...	Mohargári. Sarju valley.
14. Randia.						
tetrasperma, *Roxb.* ...	...	Sh.	2'—3'	Y.	May ...	Sarju valley ...
dumetorum, *Lam.* ...	...	Tr.	15'	Y.	Do. ...	Sarju valley Bhábar, Bágesar.
15. Gardenia.						
turgida, *Roxb.* ...	2	Tr.	30'	...	...	Bhábar ...
16. Knoxia.						
corymbosa, *Willd.* ...	...	H.	6'	...	August ...	Almora, &c. ...
brachycarpa, *Br.* ...	...	...	12"-15"	Pk.	September,	Baijnáth ...
17. Pavetta.						
indica, *L.* ...	...	...	...	...	...	...
var. tomentosa ...	...	Tr.	15'	Wh.	June ...	Kota Dún, Sarju valley.
18. Coffea.						
bengalensis, *Roxb.* ...	...	Sh.	2'-3'	Wh.	March ...	Bhábar ...
19. Hamiltonia.						
suaveolens, *Roxb.* ...	...	Sh.	10'-12'	Bl.	October ...	Kálimat, Sarju valley.
20. Leptodermis.						
lanceolata, *Wall.* ...	1	Sh.	10'	Bl.	June ...	Binsar, &c. ...
sp. ——	2	Sh.	...	...	...	Dudatoli ...
21. Spermacoce.						
lasiocarpa, *Br.* ...	...	H.	12"	Wh.	September,	Almora ...
articularis, *L. f.* ...	2	H.	12"	...	Do. ...	Do. ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Shady banks ...	6—7,000	R.	...	...	=*Hedyotis* No. 1 in Herb. S. & W.
Wet rocks ...	4,000	R.	...	...	=*Ophiorrhiza* No. 1 in Herb S. & W.
Woods ...	3—4,000	R.	...	...	
Open ...	4—6,000	R.	...	...	=*Gardenia* No. 1 in Herb. S. & W.
Forest ...	1—3,000	R.	...	...	
Do. ...	1,000	R.	...	...	
Open ...	4-500	R.	...	...	=*Spermacoce* No. 1 in Herb. S. & W.
Do. ...	4,000	R.	...	...	
...	...	...	...	...	
Forest ...	2-3,500	R.	...	...	
Do. ...	1-2,500	R.	...	...	
Open ...	2,5-6,000	R.	...	...	
Do. ...	5-8,000	R.	...	...	
Forest ...	10,000	R.	...	...	
By water ...	4,000	R.	...	...	=*Borreria lasiocarpa* in Herb. S. & W.
Open ...	4,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom)	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
22. Rubia.						
cordifolia, *L.* ...	1	H sc.	6'-10'	R.	July ...	Outer hills ...
Manjista, *Roxb.* ...	2	H. sc	3'	Gr.	Do. ...	Niti ...
Edgeworthii, *Hook.*(r)	3	H. pr.	6'	Y. Gr.	August ...	Sarju valley ...
23. Galium.						
triflorum, *Michx.* ...	1	H.	6"—12"	Pk.	May ...	Naini Tál, Dwáli. Milam.
elegans, *Wall.* ...	2 & 8	H.	6"—2'	Wh.	Do. & June	Naini Tál, Kálimundi, Rur Pass.
Mollugo, *L.* ...	3, 5, 9,	H. sc	2'—14'	R. Pk.	June, August.	Gori valley, Ramni, Binsar, Girgaon.
sp —— ...	4	H. sc.	2'	...	August ..	Binsar, Milam,
acutum, *Edgew.* ...	6	H. sc	1'—2'	Y.	September,	Badarináth ..
aparine, *L.* ...	7	H. sc	3'—5'	Y.	August ..	Rálam Niti ...
hirtiflorum, *Req.* ...	10	H. sc.	3'	...	May ...	Almora ...
LIX.—VALERIANCEÆ.						
1. Triptostegia.						
glandulifera, *Wall.* ...	...	H.	1'—2'	Wh.	May ...	Kálimundi Pass,
2. Valeriana.						
Hardwickii, *Wall.* ...	1	H.	3'—4'	Pk.	August ..	Naini Tál, Rálam valley.
var.—— ...	2	H.	12"—15"	...	Do. ...	Milam, Niti ...
sp.—— ...	3	H.	2"—3"	Pk.	July ...	Bomprás ...
sp.—— ...	4	H.	9"	..	...	Garhwál ...
Wallichii, *DC.* ...	5, 6	H.	9"—12"	Wh.	March, May.	Almora, Naini Tál, Madhári Pass.
sp —— ...	7	H.	6"	Wh.	May ...	Dwáli ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himalaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	5-7,000	R.	...	...	
Do. ...	11,500	..	D.	...	
Do. ...	3,500	R.	...	...	
Shade & open,	7—11,500	R.	D.	...	
Do. & woods ...	6—11,000	R.	...	...	
Shade & open...	5—8,000	R.	...	...	
Do. ...	7—11,000	R.	D.	..	
Open ...	10,000	..	D.	...	
Do. ...	1—12,000	R.	D.	...	
Do. ...	9—11,000	R.	..	...	
Do. ...	5,000	R.	...	...	
Forest ...	9,000	R.	...	...	
Do. ...	6—8,500	R.	...	...	
Open ...	11,500	...	D.	...	
Do. ...	14,500	...	D.	...	
...	?	...	...	...	
Do. ...	5—8,000	R.	...	...	
Do. ...	9,500	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
3. Nardostachys.						
Jatamansi, *DC.* ...	1 & 2	H.	9″-1½′	Pk.	August ...	Rálam, Milam, Pindari.
LX.—DIPSACEÆ.						
1. Scabiosa.						
Candolleana, *Wall.*,	...	H.	1′	Wh.	April ...	Almora, &c. ..
2. Dipsacus.						
inermis, *Coult.* ...	...	H.	4′-6′	Wh.	August ..	Binsár, &c. ..
3. Morina.						
longifolia, *Wall.* ...	1	H.	3′	Pk.	Do. ...	Rálam, Pindari,
persica, *L.* ...	2	H.	2′	Y.	June ...	Naini Tál ...
Coulteriana, *Royle*,	3	H.	1½′	Y.	July ...	Bampá ...
LXI.—COMPOSITÆ.						
1. Vernonia.						
anthelmintica, *Willd.*	1	H.	3′	Pr.	August ..	Almora ...
cinerea, *Less.* ...	2	H.	2′	Pr.	Do. ...	Do., &c. ...
2. Adenostemma.						
viscosum, *Forst.* ...	3	H.	2′	Wh.	Do. ...	Gori river ...
var. elatum, *Don*,	2	H.	2′	Wh.	Do. ...	Almora ...
„ latifolium, *Don* ...	1	H.	2′	Wh.	September,	Do. ...
3. Eupatorium.						
Reevesii, *Wall.* ...	1	H.	3′	Wh.	October ...	Kálimat, Binsar,
cannabinum, *L.* ...	...	...	...	...	...	...
var. indivisum ...	2	H.	3′	Y.	Do. ..	Sarju valley ...
4. Solidago.						
Virga aurea, *L.* ...	...	H.	3′-4′	Y.	September,	Almora, Naini Tál.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himálaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	12,5—13,500	R.	D.	...	
Do. ...	4—6,500	R.	...	...	
Woods ...	5—8,000	R.	...	...	
Open ..	11—12,000	R.	...	...	
Do. ...	8,000	R.	...	...	
Do. ...	10—11,000	...	D.	...	
Do. ...	5,500	R.	...	...	
Do. ...	2,5—5,500	R.	..	...	
Woods ...	5,000	R.	...	...	
Open ...	5,000	R.	..	...	
Do. ...	5,000	R.	...	...	
Forest ...	6· 7,000	R.	...	...	
...	...	..	...	...	
Open ...	4,000	R.	...	...	
Woods ...	6—7,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
5. Dicrocephala.						
latifolia, *DC.* ...	1, 2	H.	6"–1½"	...	June ...	Naini Tál, Almora, &c.
6. Cyathocline.						
lyrata, *Cass.* ...	...	H.	1'–1½'	Pr.	February,	Almora, &c. ...
7. Myriactis.						
nepalensis, *Less.* ...	2	H.	2'	W. Y.	August ...	Almora, Dwáli,
Gmelini, *DC.* ...	1	H.	1'–2'	Li.	Do. ...	Naini Tál, &c.,
8. Rhyncospermum.						
verticillatum, *Reinw.*	...	H.	2'	...	September,	Binsar ...
9. Aster.						
tricephalus, *C. B. Clarke.*	...	H.	2'	Bl	August ...	Milam, Naini Tál.
diplostephioides, *Benth.*	...	H.	9"–12"	Bl.	Do. ...	Rálam ...
molliusculus, *Benth.*,	...	H.	1'	Li.	May ...	Common ...
Thomsoni, *C. B. Clarke.*	...	H.	1'–2'	Pk.	August ...	Gangoli, &c. ...
asperulus, *Nees* ...	...	H.	1'–2'	Pk.	Do. ...	Rálam river ...
tibeticus, *Hook f.* ...	...	H.	9"	Li.	September,	Laptel ..
Stracheyi, *Hook. f.*...	...	H.	2"	?	October ...	Pindari ...
10. Erigeron.						
acre, *L.* ...	...	...	...	...	...	...
var. monticola ...	4	H.	6"–9"	Bl.	August ...	Kálimat ...
" alpinum ...	5	H.	6"	Bl.	April ...	Bomprás ...
" multicaule ...	2	H.	1'–2'	Wh.	August ...	Naini Tál, &c.
multiradiatum, *Benth.*	6	H.	1'–2'	Bl.	Do. ...	Naini Tál, Dulátoli.
sp.—— ...	...	H.	3"–8"	Li.	July ...	Kálájawar, Niti

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himálaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Open near water	5—6,500	R.	...	...	
Do. ...	2—5,500	R.	...	...	
Open ...	5—8,000	R.	...	...	
Woods ...	5,5—10,000	R.	...	...	
Do. ...	6,5—7,500	R.	...	...	= *Leptocoma racemosa* in Herb. S. & W.
Open ...	7—11,500	R.	D.	...	= *Erigeron*, No. 3 in Herb S & W.
Do. ...	13,000	R.	...	...	= *Diplopappus* No. 6 in Herb. S. & W.
Do. ...	6,—8,500	R.	...	...	= *Diplopappus* No. 1 in Herb. S. & W.
Woods ...	6,000	R.	...	...	= *Calimeris flexuosa* in Herb. S. & W.
Open ...	9,000	R.	...	...	
Do. ...	15,000	...	...	T.	= *Diplopappus* No. 2 in Herb. S & W.
Do. ...	12—12,500	R.	...	...	= *Heterochata* No. 2 in Herb. S. & W.
...	...	...	...	...	
Open ...	5—7,000	R.	...	...	
Do. ...	14—16,000	...	D.	T.	
Woods ...	5,5—7,000	R.	...	...	
Forest ...	7—9,000	R.	...	...	
Open ...	14—17,000	...	D.	T.	= *Heterchata* No. 1 in Herb. S. & W.

List of Kumaon.

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
11. Microglossa.						
albescens, *C. B. Clarke.*	...	H. Sh.	2′—3′	Li.	August ...	Dugli, Tola ..
12. Conyza.						
japonica, *Less.* ...	3	H.	9″	Pk.	March ...	Almora, Naini Tál. ..
viscidula, *Wall.* ...	2	H. Sh.	3′—4′	Pk.	February,	Outer hills ...
absinthifolia, *DC.* ...	1	H.	3′	Y.	August ...	Almora, Sába,
sp.—— ...	4	H.	9″—12″	Bl.	Do. ...	Rajhoti, Bálam
13. Blumea.						
lacera, *DC.* ...	4	H.	6″—9″	...	...	Almora ...
laciniata, *DC.* ...	3	H.	3′	...	March ...	Do. ...
oxyodonta, *DC.* ...	7	H.	...	...	...	Garhwál ...
aromatica, *DC.* ...	2	H.	3′	...	March ...	Bhábar ...
14. Laggera.						
alata, *Benth.* ...	...	H.	3′.	Pk	September,	Kapkot ...
pterodonta, *Benth.*	...	H.	4′—5′	Pk.	March ...	Outer hills ...
aurita, *Benth.*? ...	...	H	...	..	...	?
15. Sphæranthus.						
indicus, *L.* ...	...	H.	6″	Pr.	April ...	Almora ...
16. Leontopodium.						
alpinum, *Cass.* ...	1	H.	1″—1½″	...	August ...	Chor-hoti Pass,
sp.—— ...	2	H.	1″—1½″	...	Do. ...	Valleys in Gugé ...
" ...	3	H.	6″	...	Do ...	Rálam ...
" var. Stracheyi,	4	H.	1′—1½′	...	Do. ...	Tola ...
17. Anaphalis.						
cinnamomea, *Benth.*,	9	H.	2′—3′	Wh.	September,	Binsar, Naini Tál.
triplinervis, *Sims.* ...	12	H.	2′—3′	Wh.	August ...	Binsar ...
nubigena, *DC.* ...	10	H.	6″	Wh	Do. ...	Barjikáng, Topidhunga.
contorta, *Hook. f.* ...	3, 4, 8	H.	6″—1′	Wh.	Do. ... September,	Gothing, Almora, &c

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	11—11,500	R.	D.	...	= Aster ferrugineus in Herb. S. & W.
Open, near water.	5—7,000	R.	...	...	
Do. ...	4,000	R.	...	...	
Open, dry ...	5,5—8,500	R.	...	...	
Open, near water.	12—15,000	R.	D.	T	
Open ...	4,500	R.	...	...	
Do. ...	4—5,000	R.	...	...	
...	5,000	R.	...	...	
Open ...	1,000	R.	...	...	
Do. ...	3,500	R.	...	...	= *Blumea* No. 6 in Herb. S. & W.
Do. ...	4—5,000	R	...	...	= *Blumea* No. 1 in Herb. S. & W.
...	?	...	...	...	= *Blumea* No. 5 in Herb. S. & W.
Open, near water.	5,500	R.	...	...	
Open ...	16,000	...	...	T.	
Do. ...	15,000	...	...	T.	
Do. ...	11—13,000	R.	...	...	
Do. ...	11,500	...	D.	...	
Do. ...	6—8,000	R.	...	...	
Do. ...	7,5—8,000	R.	...	...	
Do. ...	14,—15,000	...	D.	T.	
} Do. ...	5,—18,000	R.	D.	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
Anaphalis— (*concld.*).						
chionantha, *DC.* ..	2	H.	12"–15"	Wh.	September,	Tola, Milam,
var.—— ...	7	H.	6"	Wh.	Do. ...	Bagdwár ...
adnata, *DC.* ...	1	H.	1'–1½'	Wh.	Do. ..	Binsar, Naini Tál.
intermedia, *DC.* ...	11	H.	8"	Wh	August ...	?
sp.—— ...	5	H.	8"	Wh.	September,	Dhauli valley,
sp.—— ...	6	H.	6"	Pk.	June ...	Pindari ...
18. Phagnalon.						
niveum, *Edgew.* ...	...	H.	6"	...	June ...	Samangentha...
19. Gnaphalium.						
hypoleucum, *DC.* ...	3	H.	1½'	...	May ...	Almora, Káthi,
luteo-album, *L.* ...	2	H.	1'	Y.	March ..	Do. ...
indicum, *L.* ...	1	H.	1'	Y.	Do. ...	Do. ...
20. Cæsulia.						
axillaris, *Roxb.* ...	...	H.	6"—9"	...	September,	Kota, Retagár,
21. Inula.						
vestita, *Wall.* ...	4	H.	1'	Y.	March ...	Almora, Hardwár.
nervosa, *Wall.* ...	3	H.	2'	Pk.	September,	Kapkot, Naini Tál.
barbata, *Wall.* ...	5	H.	2'	Y.	August ...	Rálam river ...
Cappa, *DC.* ...	1	H.	3'—4'	...	March ...	Pyura, &c. ...
cuspidata, *Hf. & T.*,	6	Sh.	4'—5'	Y.	February,	Almora, Naini Tal.
sp.—— ...	2	H.	2½'	Y.	...	...
22. Vicoa.						
auriculata, *Cass.* ...	...	H.	6"—8"	Y.	March ...	Almora ...
23. Carpesium.						
cernuum, *L.* ...	1	H.	3'	Gr. Y.	August ...	Naini Tál ...
var. pedunculosum,	...	...	...	...	...	...
abrotanoides, *L.* ...	3	H.	2'	...	August ...	Mohargári Pass, Binsar.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himalaya. Rainy.	Himalaya. Dry.	Tibet.	Remarks.
Open ..	12,000	..	D.	...	
Do. ...	8,000	R.	...	...	
Do ...	6—7,500	R.	..	...	
Do. ...	?	...	...	...	
Do. ...	9,000	R.	D.	...	
Do ...	10,500	R	...	...	
On rocks ...	7,000	R	D.	...	
Open ...	3,5—8,000	R.	...	...	
Do. ...	5,500	R.	...	...	
Do. ...	1,600	R.	...	...	
Rice fields ...	2—3,500	R.	...	...	
Open ...	1—4,000	R	...	...	
Do. ...	3,5 - 7,000	R	...	...	
Do. ...	8,5 10,000	R.	...	...	
Do. ...	4,600	R.	...	...	
Woods ...	5—7,000	R.	...	...	
...	...	...	...	...	
Open ...	4,000	R	...	...	
Woods ...	7,000	R	...	...	
...	...	...	...	...	
Woods ...	6 7,500	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
24. Adenocaulon.						
bicolor, *Hook.*, ...	...	H.	3′	Wh.	September,	Páton ...
25. Xanthium.						
Strumarium, *L.* ...	...	H.	2′	...	June ...	Almora, &c. ...
26. Siegesbeckia.						
orientalis, *L.* ...	...	H.	2′	Y.	August ...	Jalat ...
27. Eclipta.						
alba, *Hassk.* ...	...	H.	1½′	...	March ...	Almora, Naini Tál. ...
28. Blainvillea.						
latifolia, *DC.* ...	...	H.	2′	...	July ...	Do. ...
29. Bidens.						
tripartita, *L.* ...	3	H.	1′—2′	Wh.	August ...	Almora, &c. ...
pilosa, *L.* ...	2	H.	2′—4′	Wh.	February,	Rámganga river, &c.
decomposita, *Wall.*,	1	H.	4′	Y.	August ...	Almora, &c.
30. Galinsoga.						
parviflora, *Cav.* ...	...	H.	6″—12″	Wh.	All the year.	Do. ...
31. Allardia.						
glabra, *Dcne.* ...	1	H.	2″	Wh.	July ...	Chorhoti Pass,
tomentosa, *Dcne.* ...	3	H.	4″—5″	Pk.	August ...	Milam, &c. ...
	2	H.	3″	Pk.	Do.	Balchha Pass...
32. Chrysanthellum.						
indicum, *DC.* ...	...	H.	4″—5″	Y.	September.	Hawalbágh ...
33. Cotula.						
hemispherica, *Wall.*,	...	H.	6″	Y.	March ...	Pátli Dún ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Forest ...	7,000	R.	...	...	
Open ...	5,500	R.	...	...	
Forests ...	5—8,500	R.	...	...	
Open ...	5,500	R.	...	...	
Do. ...	5—6,500	R.	...	...	
Do. ...	4,000	R.	...	...	
Do. ...	3—7,000	R.	...	...	
Do. ...	4—6,000	R.	...	...	
Naturalized in gardens.	5—6,000	R.	...	...	
Open ...	16,500	...	...	T.	
Do. ...	13—15,000	...	D.	T.	
Do. ...	16—17,000	...	...	T.	
Do. ...	4,000	R.	...	...	
Do. ...	2,500	R.	...	...	= *Machlis hæmisphærica* in Herb S. & W.

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
34. Tanacetum.						
nubigenum, *Wall.*...	2	H.	1′	Y.	September,	Pindari, Tungnáth.
tibeticum, *Hf. & T.*,	3	H.	1′	Y.	August ...	Milam ...
longifolium, *Wall.* ...	1	H.	2′	Y.	September,	Pindari, Tungnáth.
tomentosum, *DC.* ...	4	H.	1′	Y.	August ...	Gothing ...
gracile, *H. f & T.*...	16	H.	...	...	September,	Satlaj river in Gugé
35. Artemisia.						
scoparia, *W. & K.* ...	1	H.	3′	...	August ...	Háwalbágh ...
stricta, *Edgew.* ...	11	H.	...	...	Do. ...	Milam, Shelong.
maritima, *L.* ...	5	H.	2′	...	Do. ...	Jelam ...
vestita, *Wall.* ...	4	H.	3′	...	Do. ...	Common ...
sacrorum, *Ledeb.* ...	15	H.	...	...	September,	Satlaj river in Gugé.
var. —— ...	6	H.	2′	Br.	August ...	Tola, Milam ...
vulgaris, *L.* ...	2, 8, 9, 14	H.	1′—3′	...	Do. ...	Almora, Kedárnath.
Roxburghiana, *Bess*, var, grata ...	3, 7	H.	3′	Br.	Do. ...	Binsar, Rálam valley.
fasciculata, *Bieb.* ...	17	H.	...	...	September,	Satlaj valley in Gugé.
hypoleuca, *Edgew.* ...	12, 13	...	...	...	August ...	Milam, Shelong, Satlaj valley in Gugé, Badarináth.
Stracheyi, *Hf. & T.*,	19	H.	1′	Y.	September,	Manasarowar...
macrobotrys, *Ledeb.*	18	H.	...	...	Do.	Milam, Topidhunga.
sp. —— ...	...	...	...	...	...	...
36. Tussilago.						
Farfara, *L.* ...	...	H.	6″—12″	Y.	May ...	Dwáli Pindari,
37. Doronicum.						
Roylei, *DC.* ...	...	H.	1½′	Y.	August ...	Tungnáth ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himálaya. Rainy.	Himálaya. Dry.	Tibet.	Remarks.
Open ...	12,000	R.	...	...	
Do. ...	13,000	...	D.	T.	
Do. ...	12,000	R.	...	...	
Do. ...	13,500	...	D.	...	
Do. ...	13,500	...	...	T.	
Do. ...	4—11,500	R.	D.	...	
Do. ...	11—12,000	...	D.	...	
Do. ...	9,000	R.	...	...	
Do. ...	6,000	R.	..	...	
Do. ...	12—13,500	...	D.	T.	
Do. ...	11,500	..	D.	...	
Do. ...	1—11,500	R.	...	...	
Do. ...	7—9,000	R.	...	...	
Do. ...	13,000	...	...	T.	
Do. ...	11—13,500	...	D.	T.	=A Roxburghiana, Bess.
Do. ...	14 - 15,500	...	...	T.	
Do. ..	11—15,000	...	D.	T.	
...	...	...	...	...	
Open, débris ...	8—11,500	R.	...	...	
Woods ...	10,000	R.	...	...	= *D. Pardalianches* in Herb. S. & W.

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant	Colour of flower.	Time of flowering.	Locality.
38 Gynura.						
nepalensis, *DC.* ...	...	H.	3′	Or.	March ...	Outer hills ...
39. Emilia.						
sonchifolia, *DC.* ...	...	H.	1′	Pk.	April ...	Almora ..
40. Senecio.						
alatus, *Wall.* ...	8	H.	2′	Y.	August ...	Naini Tál, Káthi, Rálam.
rufinervis, *DC.* ...	7	H.	2′	Y.	July ...	Naini Tál, Káthi
Kunthianus, *Wall.*,	5	H.	1′—1½′	Y.	August ...	Rálam river ...
Candolleanus, *Wall.*,	6	H.	1½′—2′	Y.	Do. ...	Pindari ...
graciliflorus, *DC.*,	3	H.	5′	Y.	Do. ..	Pindari, Rálam,
chrysanthemoides, *DC.*	10	H.	1′	Y.	July ...	Gothing ...
diversifolius, *Wall.*,	4	H.	3′	Y.	August ...	Binsar, &c. ...
nudicaulis, *Ham.* ...	2	H.	12″—18″	Y.	July ...	Almora, &c. ...
coronopifolius, *Desf.*	9	H.	2″	Y.	September,	Rákas Tál, Shelshel
pedunculatus, *Edgew.*	1	H.	9″—12″	Y.	July ...	Malári, Níti.
Ligularia, *Hook. f.* ...	...	H.	4′	Y.	August ...	Rálam river, Dudatoli.
arnicoides, *Wall.* ...	...	H.	6″	Y.	Do. ...	Rájhoti, Chorhoti, and Níti Passes.
41. Werneria.						
nana, *Benth.* ...	...	H.	4″	Y.	Do. ..	Rájhoti and Chorhoti Passes.
42. Echinops.						
cornigerus, *DC.* ...	1	H.	2′	Bl.	Do. ...	Bhim-udiyár, Malári.
niveus, *Wall.* ...	2	H.	2′	Bl.	February,	Almora, &c. ...
43. Carduus.						
nutans, *L.* ...	...	H.	...	...	...	...
var. lucida ...	...	H.	5′	Pr.	August ...	Rálam ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himalaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	2,5—4,000	R.	...	...	
Do. ...	5,000	R.	...	...	
Do. ...	8—11,500	R.	...	...	
Woods ...	7—8,000	R	...	...	
Open ...	11—13,000	R.	...	...	
Do. ...	11,000	R.	...	...	
Woods ...	9—11,000	R.	...	...	
Open ...	13,000	...	D.	...	
Do. ...	5—9,000	R.	...	...	
Do. ...	4—5,500	R.	...	...	
Do. ...	14—16,000	...	..	T.	
Do. ...	10—11,500	...	D.	...	
Do. ...	8—9,000	R.	...	...	=*Ligularia* No. 2 in Herb. S. & W.
Do. ...	15—17,000	...	...	T.	=*Ligularia* No. 4 in Herb. S, & W.
Do. ...	16—17,000	...	...	T.	*Ligularia* No. 8 in Herb. S. & W.
Do. ...	9,000	R.	D.	...	
Do. ...	4—5,000	R.	...	...	
Fields ...	12,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Height of growth.	Habit of plant.	Colour of flower.	Time of flowering.	Locality.
44. Cnicus.						
arvensis, *Hoffm.* ...	...	H.	2′	Pr.	March ..	Outer hills ...
eriophorus, *Hoffm.*,	...	...	...	...	...	...
involucratus, *DC.* ...	...	H.	6′	Pr. W.	August ..	Jalat, Rálam river.
var. horrida ..						
argyracanthus, *Benth.*	...	H.	5′	Pr. W.	April ..	Naini Tál, Rálam.
var. nepalensis ...	...	H.	6′	Pr. W.	August ...	Do. ...
Wallichii, *Benth.* ...	...	H.	6′	W.	Do. ..	Lohathal, Almora.
45. Saussurea.						
obvallata, *Wall.* ...	4	H.	1′–2′	Pr.	Do. ...	Pindari, Barjikáng Pass.
bracteata, *Dcne.* ...	2	H.	3″–6″	Pr.	Do. ...	Balchha Pass, Lanjar.
Kunthiana, *Wall.* ...	8	H.	2″–3″	...	Do. ...	Rálam, Kálajawar.
sorocephala *H.f. & T.*	5	H.	2″–3″	Pr.	Do. ...	Balchha Pass...
gossypiphora, *Don.* ...	1	H.	2″–6″	Pr.	Do. ...	Bárjikáng, Kedárnath.
graminifolia, *Wall.*,	3	H.	3″–9″	Pr.	Do. ...	Barjikáng Pass,
Candolleana, *Wall.* ...	13	H.	3′	Pr.	Do. ..	Pindari ..
piptathera, *Edgew.*,	12	H.	3′	Pr.	Do. ..	Do. ...
candicans, *Clarke* ...	...	H.	1′–2′	Pk.	March ...	Hawalbágh, Naini Tál.
albescens, *Hf & T.*,	15	H.	5′	...	August ...	Josimath, Gágar.
denticulata, *Wall.* ...	11	H.	4′	Pr. Br.	Do. ...	Dwáli, Rálam, Níti.
hypoleuca, *Spreng.*,	...	H.	4′	...	Do. ...	Jalat, &c. ...
deltoidea, *Clarke* ...	...	H.	6′	Pr.	Do. ...	Do. ...
sp. —— ...	6	H.	1″–2″	Pr.	Do. ...	Unta-dhura ...
„ —— ...	7	H.	3″–6″	Pr.	Do. ...	Balchha Pass...
„ —— ...	9	H.	1′	...	Do. ...	Plain of Gugé,
„ —— ...	10	H.	4″–6″	...	Do. ..	Gotbing ...
46. Jurinea.						
macrocephala, *Benth.*	...	H.	1′	Pr.	Do. ...	Rálam, Pindari.
47. Serratula.						
pallida, *DC.* ...	...	H.	1½′–2′	Pr.	June ...	Binsar, Gágar,

Plants—(continued).

Conditions of soil, &c.		Elevation in feet above the sea.	*Himalaya.* Rainy.	*Himalaya.* Dry.	Tibet.	Remarks.
Fields	...	1—5,000	R.	...	...	= *Cirsium* No 4½ in Herb. S. & W.
...		...	..	...	...	
Open	...	9—10,000	R.	...	...	= *Cirsium* No. 3 in Herb. S. & W.
Do.	...	4,5—7,500	R.	...	...	= *Cirsium* No. 2 in Herb. S. & W.
Do.	...	7—11,500	R.	...	...	= *Cirsium* No 1 in Herb. S. & W.
Do.	...	3—7,000	R.	...	...	= *Cirsium* No. 4 in Herb. S. & W.
Do.	...	12,5—15,000	R.	...	...	
Do.	...	16—17,000	...	..	T	
Do.	...	12,5—15,000	R	D.	...	
Do.	...	16—17,000	...	...	T.	
Do.	...	12—14,500	R	...	...	
Do.	...	13—14,000	R.	D.	...	
Do.	...	12,500	R.	...	...	
Do.	...	[illegible]	R	...	..	
Banks	...	[illegible]—7,000	R	...	...	= *Aplotaxis* No. 2 in Herb. S. & W.
Open	...	6,500	R		..	
Do		7—10,000	...	D	...	
Do.	...	6—7,000	R	...	...	= *Aplotaxis* No. 6 in Herb. S. & W.
Do.	...	6—7,000	R.	...	..	= *Aplotaxis* No. 5 in Herb. S. & W
Do.	..	16,000	...	..	T	
Do	...	16,000	..	...	T.	
Do.	...	16,000	...	...	T.	
Do.	...	13,500	R	D	...	
Do.	...	[illegible]	R.	...	...	= *Dolomiaea macrocephala* in Herb
Do	.	[illegible]	R	..	..	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
48. Tricholepis.						
furcata, *DC.* ...	1	H.	2′—3′	..	September,	Har tol Pass ...
elongata, *DC.* ...	2	H.	4′	Buff	July ..	Almora ...
49. Carthamus.						
tinctorius, *L.* ...	...	H.	3′	Sc.	March ...	Outer hills ...
50. Leucomeris.						
spectabilis, *Don* ...	...	S. Tr.	10′—20′	Wh.	May ...	Do. ...
51. Ainsliæa.						
pteropoda, *DC.* ...	1	H.	1½′	Pk	March ...	Naini Tál, &c.,
aptera, *DC.* ...	2	H.	2′—3′	Wh.	Do. ...	Gágar, &c. ...
52. Gerbera.						
lanuginosa, *Benth.*,	...	H.	6″—8″	Pk.	Do. ..	Naini Tál, &c,
macrophylla, *Wall.*,	...	H.	2′	Wh.	December,	Binsar, &c. ...
53. Pieris.						
hieracioides, *L.* ...	...	H.	1½′—3′	Y.	August ..	Tola, Níti, Byánsi.
54. Crepis.						
fœtida, *L.* ...	...	H.	6″—8″	Y.	April ..	Almora, &c.
japonica, *Benth.* ...	...	H.	2′—3′	Y.	February,	Outer hills ...
glauca, *Benth* ...	...	H.	6″	Y.	September,	Milam, Níti ...
glomerata, *Dcne.* ...	...	...	...	...	...	Barjikáng Pass.
55. Taraxacum.						
Dens-leonis, *Desf.*,	...	...	...	...	...	...
var. eriopodum ...	2	H.	3″—4″	Y.	All the year.	Kálam, Naini Tál.
„ parvulum ...	1	H.	2″	Y.	Do. ...	...
„ —— ...	3	H.	6″	Y.	August ...	Níti ..
„ —— ...	4	H.	1″	Y.	Do. ...	Kyangar Pass,

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	8,000	R.	...	..	
Do. ...	5,500	R.	...	...	
Cultivated ...	1—4,000	R.	...	...	
Dry, open ...	3—5,000	R.	...	...	
Woods ...	6—7,000	R.	...	...	
Do. ...	6,5—7,500	R.	...	...	
Open rocks ...	6,5—8,500	R.	...	...	=*Oreoseris lanuginosa* in Herb. S & W.
Open ...	6,5—7,500	R.	.	...	=*Berniera nepalensis* in Herb. S. & W.
Do. ...	7,5—11,500	R.	D.	...	
Do. ...	5—7,000	R	...	...	=*Barkhausia fœtida* in Herb. S & W.
Do. ...	1—5,500	R.	...	...	=*Youngia* No 1 in Herb. S. & W.
Do. ...	11—12,500	...	D.	...	=*Youngia* No. 2 in Herb. S & W.
Do. ...	14,000	..	...	..	
...	...	...	...	...	
Do. ...	7—10,000	R.	D.	...	
Do. ...	5—10,000	R.	...	...	
Do. ...	11,500	...	...	T.	
Do. ...	16,000	..	...	...	

List of Kumaon

Name	Herbarium number (Strachey and Winterbottom)	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
56. Lactuca.						
obtusa, *Benth.*	...	H.	1′–1½′	Y.	February,	Almora, &c.
dissecta, *Don*	3	H.	1′–2′	Pr.	April	Almora
longifolia, *DC.*	2	H.	2′	Pr.	August	Ramganga valley, Almora.
sagittarioides, *C. B. Clarke*	1,4	H.	1′–1½′	Pr.	August	Gangoli
Brunoniana, *Wall.*	..	H.	2′–3′	Li.	August	Kálimundi
graciliflora, *DC.*	...	H	1′–2′	Bl.	August	Rilam, Milam,
macrorhiza, *Hook. f.*	...	H.	1′–2′	Bl.	August	Rálam, Niti
var saxatilis	...	H.	1½′	Bl.	August	Niti
Lessertiana, *Wall.*	...	H	1½′–8′	Bl.	August	Niti, valleys of Gogá, Pálam.
Dubyæa, *Benth.*	...	H.	3′	Y.	August	Sála, Pindari,
sp ——	...	H.	2′	Y	May	Sarju valley
57. Sonchus.						
asper, *Vill.*	2	H.	3′	Y.	February,	Outer hills
arvensis, *L.*	1	H.	3′–4′	Y.	February,	Ditto
58. Tragopogon.						
gracile, *Don.*	...	H.	6″–9″	Y.	April	Almora
LXIII.—CAMPANULACEÆ.						
1. Lobelia.						
Wallichiana, *Hf. & T.*	1	H.	4′	Pk.	February,	Naini Tál
pyramidalis, *Wall.*	2	H.	6′	Pr.	October	Namik, Jagesar,
trialata, *Ham.*	3	H.	4′	...	September,	Dhanpur
2. Cephalostigma						
hirsutum, *Edgew.*	...	H.	1″–2″	...	...	Almora
3. Wahlenbergia.						
gracilis, *DC.*	2	H.	6″	Bl.	March	Almora

Plants—(continued).

Condition of soil, &c.	Elevation in feet above the sea.	*Himálaya.* Rainy.	*Himálaya.* Dry.	Tibet.	Remarks.
Open ..	4 –5,500	R.	...	...	= *Microrhynchus* No. 1 in Herb. S & W.
Do. ...	5,550	R.	...	...	
Do. ..	4—5,500	R.	..	..	
Do. ...	5,500	R.	...	...	= *Melanoseris* No. 4½ in Herb. S. & W.
Forest ...	7,5—9,000	R.	...	...	= *Prenanthes* Nos. 1 & 3 in Herb. S & W.
Open ...	12,000	R.	D.	..	= *Mulgedium graciliflorum* in Herb. S. & W.
Open rocks .	7—11,500	R.	D.	...	= *Melanoseris* No. 1 in Herb. S. & W.
Open ..	11,500	..	D.	...	= *Melanoseris* No. 4 in Herb. S. & W.
Open rocks ...	12—16,000	..	D.	T.	= *Melanoseris* Nos. 2 & 3 in Herb. S. & W.
Open ..	9—12,500	R.	...	...	= *Dubyæa hispida* in Herb. S & W.
Do. ...	4,000	R.	.	..	= *Microrhynchus* No. 2 in Herb. S. & W.
Do. ...	1—5,500	R.	...	.	
Do. ...	1—5,500	R.	...	...	
Do. ...	5—6,000	R.	...	...	
Do. ...	5—6,000	R.	..	..	= *L. pyramidalis* in H. Ind. iii., p. 426.
Forest ...	6—7,000	R.	...	...	
Fields ...	6,000	R.	...	..	
Open ...	5,000	R.	...	...	
Do. ...	5,000	R.	...	...	= *Campanula* No. 11 in Herb. S. & W.

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
3. Wahlenbergia (*concluded*).						
peduncularis, *A.DC.*	3	H.	4"	Li.	May ...	Chaur ...
sp —— ..	1	H.	3"—4"	...	...	...
4. Codonopsis.						
purpurea, *Wall.* ...	1	H. sc.	3′	Pr.	August ..	Laháthal ...
lurida, *Lindl.* ...	2	H sc	4′	Pr. Gr.	August ..	Rálam river ..
viridis, *Wall.* ...	8	H. sc.	10′	Gr. Br.	August ..	Rathi, Kálimundi Pass.
5. Cyananthus.						
lobatus, *Wall.* ...	1	H.	12"	Bl.	August	Pindari, Rálam
linifolius, *Wall.* ...	2	H.	6′	Bl	August ..	Ditto ...
integer, *Wall.* ...	3	H.	9"	Bl.	August ...	Rúr Pass ...
6. Campanula.						
latifolia, *L.* ...	1	H.	3′	Pr.	August ...	Kálimundi Pass, &c.
argyrotricha, *Wall.*,	2	H.	3"—4"	Bl.	August ...	Champwa, Niti
aristata, *Wall.* ...	3	H.	8"	Bl.	August ...	Shárgchá, Milam.
cana, *Wall.* ...	4, 7	H.	6"—10"	Bl.	August ...	Naini Tál ...
carnosa, *Wall.* ...	5	H.	6′	Bl	May ...	Mádhári Pass
cashmiriana, *Royle*,	6	H.	8"	Pk.	August ...	Milam, Niti ...
ramulosa, *Wall.* ...	9	H.	2′	Bl.	August ...	Laháthal, &c.,
sylvatica, *Wall.* ...	10	H.	9"—12"	Bl.	August ...	Binsar, &c. ..
canescens, *Wall.* ...	12	H.	10"	Bl	March ...	Almora ...
colorata, *Wall.* ...	13	H.	1′—2′	Bl.	March ...	Almora ...
LXIV.—ERICACEÆ.						
1. Gaultheria.						
trichophylla, *Royle.*	1	Sh.	3"—4"	Pk.	June ...	Mádhári Pass,
nummularioides, *Don* ...	2	Sh.	9′	Pk.	June ...	Láhúr ...
2. Cassiope.						
fastigiata, *Don* ...	...	Sh.	1′	Pk.	June ...	Pindari, &c. ...
3. Andromeda.						
ovalifolia, *Wall.* ...	3	Tr.	20′	Wh.	June ..	Naini Tál, &c.,
villosa *Wall.* ...	2	Tr.	10′	Wh.	June ..	Rogila ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himalaya. Rainy.	Himalaya. Dry.	Tibet	Remarks.
Open	6—7,000	R.	...	...	=*Campanula* No. 8 in Herb. S. & W.
...	...	R.	...	...	
Do.	6,000	R	...	...	
Do.	10,000	R	...	...	= *C. rotundifolia, Benth?*
Do.	6,5—7,000	R.	...	...	
Do.	10—12,000	R.	...	...	
Do.	12—13,000	R.	..	...	
Open rocks	10—11,000	R.	...	...	
Open	8,5—11,000	R	D.	...	
Do.	8—11,000	R.	D.	...	
Do.	13—15,000	...	D.	T	
Do.	7—8,000	R	...	...	
Forest	8,500	R.	...	...	= *Peracarpa carnosa, H. F. & T.*
Open	12—13,000	...	D.	...	
Do.	6—12,000	R.	...	..	= *C. colorata* No. 13
Do.	5—7,000	R.	...	...	
Do.	5,500	R.	...	...	
Do.	5—8,000	R.	...	...	
Open banks	10—12,000	R.	...	...	
Do.	7,5—10,000	R	...	...	
Open	11—14,500	R.	D.	...	
Forest	5—9,000	R.	...	...	= *Pieris* No. 1 in Herb, S. & W.
Do.	10,000	R.	...	...	= *Ditto* No. 2 in Herb. S. & W.

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
4. Rhododendron.						
lepidotum, *Wall.* ...	1	Sh.	1"—1¼"	Pk.	June ..	Pindari, Bompras.
anthopogon, *Don* ...	2	Sh.	1'—2'	Y.	June ..	Ditto ...
campanulatum, *Don*,	3	Sh.	10'	Li.	May ...	Pindari, &c. ..
nobile, *Wall.* ...	4	Sh.	8'	..	...	Champwa ...
? ...	5	Tr.	20'	R.	May ..	Jhuni ...
barbatum, *G. Don*,	6	Tr.	20'—25'	R.	May ...	Mádhári Pass,
arboreum, *Sm.* ...	...	..	.	...	...	...
var. roseum ...	7	Tr.	25'	R.	May ...	Námik ...
„ puniceum ...	8	Tr.	25'—40'	R.	May ..	Naini Tál, &c.,
LXV.—PRIMULACEÆ.						
1. Primula.						
speciosa, *Don* ...	1	H.	1'—1¼'	Pr.	January ...	Almora, &c. ...
denticulata, *Sm.* ...	2	H.	1'	Pr	March ...	Naini Tál, &c.,
capitata, *Hook.* ...	3	H.	9"	Pr.	May ...	Pindari, Rajhoti.
Stuartii, *Wall.* ..	4	H.	1'—2'	Pr.	June ...	Pindari, &c. ...
Moorcroftiana, *Wall.*,	5	H.	3"—4"	Pr.	July ..	Niti Pass ...
sibirica, *Jacquem.* ..	6	H.	1'—1½'	Pr.	July ...	Pindari, Níti, &c.
var. tibetica ...	15	H.	1"	Pr.	September,	Gyanima ...
floribunda, *Wall.* ...	7	H.	4"—6"	Y.	January ..	Naini Tál ...
pulverulenta, *Edgew.*,	8	H.	6"	Pr.	April ..	Mádhári Pass,
nana, *Wall.* ...	9	H.	6"	Pr.	May ...	Champwa, Pindari.
sulphurea, *Hook. f.* ...	10	H.	3"	Pr.	February,	Suring ...
petiolaris, *Wall.* ...	11	H.	4"—6"	Pr.	May ...	Mádhári pass...
autumnalis, *Hook. f.*	12	H.	4"	Pr.	October ..	Namik ...
Stracheyi, *Hook. f.*	13	H.	¼"	Pr.	August ...	Barjikáng Pass,
minutissima, *Jacquem.* ...	14	H.	¼"	Pr.	July ...	Barjikáng Pass, Bomprás.
2. Androsace.						
rotundifolia, *Hardw.*,	1	H.	3"	Wh.	February,	Plains, Bágesar.
incisa, *Wall.* ...	2	H.	3"	Pk.	May ..	Almora ...
lanuginosa, *Wall.* ...	3	H.m.	3"	Pk.	May ..	Naini Tál ...
sarmentosa, *Wall.* ..	4	H.m.	6"—9"	Pk.	July ...	Ralam, &c. ...
Jacquemontii, *Duby*,	3, 10	H.m.	1"—3"	Pk. Pr.	August .	Topidhunga Langar.
pedicellata, *Royle* ...	6	H.	— 6"	Pk	May ...	Dwáli ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.* Rainy.	*Himalaya.* Dry.	Tibet.	Remarks.
Open	9—14,000	R.	D.	...	
Do.	10—14,000	R.	D.	...	= *Osmothamnus* in Herb. S. & W.
Do.	9—12,500	R.	D.	...	
Do.	10,000	R.	...	...	
Forest	9,000	R.	...	...	
Do.	9—10,500	R.	...	...	
...	...	...	...	...	
Do.	10—11,000	R.	...	...	
Do.	4—10,500	R.	D.	...	
Near water	4—6,000	R.	...	...	
Woods	7,5—10,000	R.	...	...	
Open	12—15,000	R.	D.	T.	
Do.	11,5—14,000	R.	D.	T.	
Do.	16,800	...	...	T.	
Open, wet	11—16,000	R.	D.	T.	
Wet	15,500	...	...	...	
Wet banks	3—7,000	...	...	...	
Wet rocks	8,000	R.	...	...	
Open	12,000	...	...	...	
Shady banks	4,500	...	...	...	
Open & woods,	9—12,000	R.	...	...	
Woods, wet	8,000	R.	...	...	
Open	14—15,000	R.	...	...	
Do.	14—16,000	R.	D.	T.	
Fields	1—3,000	R.	...	...	
Open	5—7,500	R.	...	...	
Do.	6—7,500	R.	...	...	
Do. banks	8—12,000	R.	...	...	
Open	15—17,000	...	...	T.	
Banks	8,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
2. **Androsace**—(*concluded*).						
sp. —— ...	7	H.	3"—4"	Pr.	July ...	Bampa, Níti ...
villosa, *L.* ...	8, 11	H. st.	1"—2"	Pr.	July ...	Milam, Rogila, Gugé.
globifera, *Duby.* ...	9	H.	1"	Pr.	July ...	Barjikáng Pass,
3. **Lysimachia.**						
debilis, *Wall.* ...	1	H. cr.	6"	Y.	June ...	Gágar ...
pyramidalis, *Wall*,	2	H.	1½'	Pk.	July ...	Binsar ...
sp. —— ...	3	H.	4"—6"	Pk.	May ...	Mádhári Pass, Dwáli.
alternifolia, *Wall.*,	4	H.	6"	Pk.	July ...	Almora, &c. ...
lobelioides., *Wall.*,	5	H.	1½'	Pk.	August ...	Jágesar ...
4. **Anagnathis.**						
arvensis, *L.* ...	...	H.	6"	Bl.	February,	Outer hills ...
LXVI.—MYRSINACEÆ.						
1. **Mæsa.**						
argentea, *Wall.* ...	1	Sh.	5'—6'	...	May ...	Binsar ...
indica, *A.DC.* ...	2	Sh.	15'—20'	...	March ...	Kota, outer hills.
2. **Myrsine.**						
bifaria, *Wall.* ...	1	Sh.	3'—4'	R.	February,	Binsar, &c &c.,
semiserrata, *Wall.*,	2	Sh.	20'	...	March ...	Naini Tál, &c.,
3. **Embelia.**						
robusta, *Roxb.* ...	...	Sh.	15'	...	...	Kota- Dún ...
4. **Ardisia.**						
floribunda, *Wall.* ...	...	Sh.	10'	Pk.	May ...	Below Binsar,
humilis, *Vahl.* ...	...	Sh.	8'	...	...	Punágiri ...
LXVII.—SAPOTACEÆ.						
1. **Bassia.**						
butyracea, *Roxb.* ...	1	Tr.	35'	...	January ...	Bhábar ...
sp.—— ...	2	Tr.	25'	...	January ...	Sarju valley ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya* Rainy.	*Himálaya* Dry.	Tibet.	Remarks.
Rocks ..	11—12,000	...	D.	...	
Open ...	11—15,500	R.	D.	T.	
Do. ...	14,700	R.	...	...	
Wet, shade ...	6—7,000	R.	...	...	
Woods ...	7,000	R.	...	...	
Damp woods ...	9,000	R.	...	...	
Open ...	5—6,500	R.	...	...	
Open, by water,	4—7,000	R.	...	...	
Fields ...	1—5,000	R.	...	...	
Forest ..	5,000	R	...	...	
Do. ...	2—5,000	R.	...	...	
Woods ...	5—7,000	R.	...	...	
Do. ...	7,000	R.	...	...	
Forest ...	1,500	R.	...	...	
Do. ...	4,000	R.	...	...	
...	2—4,000	R.	...	..	
Forest ...	1,000	R.	...	...	
Do. ..	3,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
LXVIII.—EBENACEÆ.						
1. Diospyros.						
lanceæfolia, *Roxb.* ..	...	Tr.	30′	Wh.	...	Kota Dún ..
LXIX.—STYRACEÆ.						
1. Symplocos.						
cratægoides, *Don* ...	1	Tr.	15′—25′	Wh.	May ...	Binsar, Almora,
Hamiltoniana, *Wall.*,	2	Tr.	20′	Wh.	March ...	Eastern Bhábar,
ramosissima, *Wall.*,	3	Tr.	20′	Wh.	May ...	Binsar, Gágar,
polystachya, *Wall.*,	4	Tr.	35′	Wh.	September,	Maikhanda ...
LXX.—OLEACEÆ.						
1. Jasminum.						
revolutum, *Sims* ...	1	Sh.	15′	Y.	May ...	Dwáli ..
var inodorum ...	2	Sh.	10′	Y.	April ...	Naini Tál ..
pubescens, *Willd.* ...	3	S. sc.	10′—15′	Wh.	March ...	Bhábar, Bágesar.
officinale, *L.* ...	4	S. sc.	10′	Wh.	May ...	Naini Tál, Káthi.
grandiflorum, *L.* ...	5	Sh.	8′—10′	Wh.	March ...	Almora, outer hills.
dispermum, *Wall.* ...	6	S. sc.	10′	Wh.	April ..	Rámgar valley,
arborescens, *Roxb.* ..	7	S. sc.	8′—10′	Wh.	February,	Bhábar ...
glandulosum, *Wall.*,	8	Sh.	10′	Wh.	May ...	Bhainskhet ...
2. Nyctanthes.						
arbor-tristis, *L.* ...	...	Sh.	10′—20′	...	May ...	Kota Dún ...
3. Schrebera.						
swietenoides, *Roxb.*,	...	Tr.	20′—30′	Wh.	June ...	Do. ...
4. Syringa.						
Emodi, *Wall.* ...	...	Sh.	15′	Wh.	May ...	Dwáli, Niti, &c.
5. Fraxinus.						
floribunda, *Wall.* ...	1	Tr.	40′	Gr.	April ...	Naini Tál, Binsar.
xanthoxyloides, *Wall.*,	2	Tr.	20′	...	May ...	Dhauli river ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himálaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Forest	2,000	R.	...	...	
Do.	4—8,000	R.	...	...	
Do.	1,000	R.	...	...	
Do.	7—8,000	R	...	...	
Do.	6,500	R.	...	...	
Do.	8,5—9,500	R.	...	...	
Woods	6,5—7,500	R.	...	...	
Do.	1—3,000	R.	...	...	
Do.	7—8,000	R.	...	...	
Open	4—8,000	R.	...	...	
Do.	4—7,000	R.	...	...	
Do.	1—2,500	R.	...	...	
Do.	2,5—3,500	R.	...	...	
Do.	2,5—3,500	R.	...	...	
Forest	1,500	R.	...	...	
Do	8,5—11,500	R.	D.	...	
Do.	6,5—8,000	R.	...	...	
Open	9—10,000	...	D.	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
6 Olea.						
glandulifera, *Wall.* ...	1	Tr.	30′	Wh.	April ...	Naini Tál, outer hills.
acuminata, *Wall.* ...	2	Tr.	40′—50′	Wh.	June ...	Kapkot ...
cuspidata, *Wall.* ...	3	Sh.	10′	...	June ...	Josimath ...
compacta, *Wall.* ...	4	Tr.	30′	Wh.	May ..	Satrali valley,
7. Ligustrum.						
nepalense, *Wall.* ...	1	Sh.	15′	Wh.	June ...	Binsar ...
bracteolatum, *Don,*	2	Tr.	20′	Wh.	May ...	Kapkot ...
robustum, *Hf. & T.*	3	Tr.	15′	Wh.	May ...	Tola (Sarju valley).
LXXI.—APOCYNACEÆ.						
1. Carissa.						
diffusa, *Roxb.* ...	...	Sh.	10′	W.	June ...	Outer hills ...
2. Vinca.						
pusilla, *Murr.* ...	...	H.	1′	Bl.	October ...	Háwalbágh ...
3. Alstonia.						
scholaris, *R. Br.* ...	...	Tr.	30′—40′	Wh.	March ..	Kota Dún ...
4. Tabernæmontana.						
coronaria, *R. Br.* ...	...	Sh.	6′	Wh.	July ...	Bágesar ...
5. Holarrhena.						
antidysenterica, *Wall.* ...	1	Tr.	25′	Wh.	January ...	Bhábar ...
pubescens, *Wall.* ...	2	Tr.	20′	Wh.	January ...	Do. ...
6. Vallaris.						
dichotoma, *Wall.* ..	...	S. sc.	15′—20′	Wh.	March ...	Do. ...
7. Wrightia.						
mollissima, *Wall* ...	...	Tr.	30′	Wh.	January ...	Do. ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open	3,500	R.	...	...	
Forest	3,500	R.	...	...	
Woods	6—8,000	R.	...	...	
Do.	5—6,000	R.	...	...	
Forest	6—7,000	R.	...	...	
Do.	3,500	R.	...	...	
Open	6,500	R.	...	...	
Forest	1—3,500	R.	...	...	
Open	4,000	R.	...	...	
Forest	1—2,000	R.	...	...	
Cultivated	1—3,000	R.	...	...	
Forest	1,000	R.	...	...	
Do.	1,000	R.	...	...	
Open	1—3,000	R.	...	...	
Forest	1—2,500	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
8. Nerium.						
odorum, *Soland.* ...	...	Sh	6'	Pk.	May ...	Bágesar, &c. ...
9. Chonemorpha.						
macrophylla, *G. Don,*	...	Tr.	...	...	...	...
LXXII.—ASCLEPIADACEÆ.						
1. Cryptolepis.						
reticulata, *Wall.* ...	...	S. sc.	10'	...	...	Bágesar, Bhábar.
2. Periploca.						
calophylla, *Falc.* ...	...	S. sc.	40'	Gr. Br.	March ...	Outer hills ...
3. Calotropis.						
procera, *R. Br.* ...	1	Sh.	8"—10"	Wh. Pr.	March ...	Bhábar ...
gigantea, *R. Br.* ...	2	Sh.	...	...	March ...	Do. ...
4. Vincetoxicum.						
sp.—— ...	...	H.	1'	...	July ...	Bampá, Bhatkot
5. Cynanchum.						
auriculatum, *W. & A.*	1	H. Sc.	8'	Gr. Y.	August ...	Rálam Valley,
glaucum, *Wall.* ...	2	H.	1'—1½'	Y.	August ...	Almora, Naini Tál.
Dalhousiæ, *W. & A.*	3	H. Sc.	2'—3'	...	August ...	Damus, &c. ...
6. Pentasachme.						
Wallichii, *Wight* ...	...	Sh.	6"—12"	Wh.	May ...	Kapkot ..
7. Gongronema.						
nepalense, *Dcne* ...	...	H. Sc.	10'	Y.	August ...	Bágesar, Mohargári.
8. Tylophora.						
Govanii, *Dcne.* ...	1	Sh.	12"	Pr.	June ...	Jagthána Pass.
hirsuta, *Wight* ...	2	...	...	...	...	?

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Near water ...	1—4,000	R.	...	...	
...	...	R.	...	...	
Open ...	1—3,500	R.	...	...	
Forest ...	4,500	R.	...	...	
Open ...	1—1,500	R.	...	...	
Do. ...	1—1,500	R.	...	...	
Do. ...	9—10,500	R.	D.	...	
Forest ...	8,500	R.	...	...	
Ditto. ...	5 - 8,000	R.	...	...	
Open. ...	5—6,500	R.	...	...	
Shady, wet. ...	3,500	R.	...	...	= *Marsdenia* No. 5 in Herb S. & W.
Open ...	3—5,000	R.	...	...	
Ditto. ...	8,400	R.	...	...	
...	?	...	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower	Time of flowering.	Locality.
9. Marsdenia.						
tenacissima, *W. & A.*	1	H. Sc.	8′—10′	...	July ...	Almora.
Calesiana, *Wight* ...	2	S. Sc	...	...	July ...	Ditto.
Roylei, *Wight* ...	3	S. Sc.	10′	Or.	May ...	Sarju valley, Naini Tál..
lucida, *Edgew.* ...	4	H. Sc.	30	Pr.	August ...	Binsar, Naini Tal.
sp.—— ...	6	...	...	...	...	?
10. Pergularia.						
odoratissima, *L.* ...	...	H. Sc.	15′	...	June ...	Almora, outer hills. ...
11. Hoya.						
lanceolata, *Wall.* ...	1	S. sc.	20′	Wh.	March ...	Kota Dún, Kapkot.
longifolia, *Wall.* ...	2	S. sc.	15′	...	...	Bágesar ..
12. Leptadenia.						
viminea ...	...	Sh.	4′—6′	...	May ...	Bhábar ...
13. Ceropegia.						
elegans, *Wall* ...	1	H. Sc.	10′	Pr.	July ...	Almora ...
Wallichii, *Wight* ...	2	H.	1′	Pr.	April ...	Naini Tál ...
LXXIII.—LOGANIACEÆ.						
1. Buddleia.						
crispa, *Benth.* ...	1	Sh.	6′—10′	Li.	March ...	Almora ...
Noemda, *Ham.* ...	2	Sh.	6′—10′	Wh.	April ...	Bhábar ..
2. Gardneria.						
angustifolia, *Wall.*	...	S. sc.	15′	...	March ...	Binsar, Gágar,
LXXIV.—GENTIANACEÆ.						
1. Crawfurdia.						
fascicu'ata, *Wall.* ...	...	H. sc.	7″—10″	Bl.	August ...	Mádhári Pass.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	4,500	R.	...	...	
Ditto. ..	4,500	R.	...	...	
Ditto. ...	5—6,000	R.	...	...	
Woods. ..	5—7,500	R.	...	...	
...	...	...	...	...	
Open. ..	2—4,000	R.	...	...	
Forest ..	3,500	R.	...	...	
On rocks ...	3—3,500	R.	...	...	
River beds ...	1—2,000	R.	...	...	= *Orthanthera* in Herb. S. W.
Open ..	4,500	R.	...	...	
Do. ...	6,500	R.	...	...	
Do. ...	5—8,000	R.	...	...	
Do. ...	1—1,500	...	D.	...	
Forest ...	6,5—7,000	R.	...	...	
...	...	...	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
2. Gentiana.						
aprica, *Dcne.* ...	1	H.	3″—4″	Bl.	March ...	Kota Dún ...
tubiflora, *Wall.* ...	2	H.	1″	Pr.	August ...	Barjikáng Pass
venusta, *Wall.* ...	3	H.	1″—1½″	Bl.	August ..	Do. ...
depressa, *Don* ...	4	H.	3″	Bl. W.	August ...	Milam ...
capitata, *Ham.* ...	5	H.	4″	Bl.	March ...	Shaidevi ...
decemfida, *Ham.* ...	6	H.	4″	Bl.	May ..	Dwáli ...
marginata, *Griseb.*,	7	H.	2″	Bl.	March ..	Almora, Naini Tál.
sp.—— ...	8	H.	1″	Bl.	May ..	Champwa ...
pedicella, *Wall.* ...	9	H.	3″—6″	Bl.	May ...	Námik, Naini Tál.
sp.—— ...	10	H.	2″—6″	Bl.	May ..	Almora, Naini Tál.
sp.—— ...	11	H.	½″	Bl.	June ...	Sagtea, Deo Pass.
argentea, *Royle* ...	12	H.	1″	Bl.	June ..	Do. ...
Moorcroftiana, *Wall.*,	13	H.	3″—4″	Bl.	September,	Rajhoti, Pindari.
sp.—— ...	14	H.	4″	Bl.	September,	Valleys of Gugé.
aquatica, *L.* ...	15	H.	1″—2″	Bl.	September,	Gating, Gyanima.
tenella, *Fries* ...	16	H.	3″	Bl.	September,	Sángchá, &c. ...
nubigena, *Edgew.* ...	17	H.	6″	Bl.	September,	Rakas Tál, Balchha Pass
sp.—— ...	18	H.	¼′	Bl.	September,	Barjikáng Pass,
squarrosa, *Ledeb.* ..	19	H.	½″	Bl.	September,	Topidhunga ...
sp.—— ...	20	H.	6″—8″	Wh.	September,	Milam, Lanjar,
sp.—— ...	21	H.	1′—1¼′	Wh.	August ...	Ralam ...
decumbens, *L.* ...	22	H.	6″	Bl.	August ...	Rajhoti ...
3. Pleurogyne.						
corinthiaca, *Griseb.*	2	H.	4″	Bl.	August ..	Milam, Rajhoti,
var.—— ...	1	—	...	...	...	...
4. Ophelia.						
cordata, *Don* ...	1, 8	H.	1′—3′	...	August ..	Naini Tál, Binsar, Kálimundi, and Mádhári Passes.
floribunda, *Don* ...	2	H.	3′	Gr. Y.	August ..	Naini Tál ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya*		Tibet.	Remarks.
		Rainy.	Dry.		
Shady banks ...	2,000	R.	...	...	
Open ...	14,000	R	...	...	
Do. ...	14,000	R.	..	...	
Do. ...	12,000	...	D.	...	
Do. ...	6,000	R.	...	...	
Do. ...	8,2,000	R	...	...	
Do. ...	6–7,000	R.	...	...	
Do. ...	12,000	R	...	...	
Open ..	7—8,500	R.	...	...	
Do. ...	5—8,000	R.	...	..	
Do. ...	11,500	R.	..	..	
Do. ...	11,500	R.	..	.	
Do. ...	12–15,000	R.	D.	T.	
Do. ...	16,000	...	...	T	
Wet open ..	13,5 —1500	...	D.	T.	
Open ...	15,000	...	D.	T.	
Do. ..	16–17,000	...	..	T.	
Do. ..	14,500	R.	...	.	
Do. ...	15,000	...	...	T.	
Do. ...	13—17,000	..	D.	T.	
Do. ...	12,000	R.	...	..	
Do. ...	15,000	...	...	T.	
Do. ...	12–15000	...	D.	T.	= *Swertia* No. 1 in Herb. S. and W.
...	...	...	...	...	
Do. ...	6–10,000	R.	...	...	
Do. ...	7—8,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour or flower.	Time of flowering.	Locality.
4. Ophelia—(*concluded*).						
alata, *Griseb.* ...	3, 5	H.	2'—3'	...	August ...	Binsar, Almora.
purpurascens, *Don*,	4	H.	2'—3'	...	August ...	Do. Naini Tál,
angustifolia, *Don* ...	6	H.	1'—2'	...	August ..	Almora, Sarju valley.
paniculata, *Don* ...	7	H.	2'	...	August ..	Binsar, Gágar,
pulchella, *Don* ...	9	H.	...	...	...	Almora ..
Dalhousiana, *Griseb.*,	10	H.	1'—2'	...	August .	Rálam ...
5. Swertia.						
speciosa, *Wall.* ...	2	H	3'—4'	W. Bl.	August ..	Pindari, Rálam.
cœrulea, *Royle* ...	3	H.	9"—12"	Bl.	August ...	Rálam ...
6. Halenia.						
elliptica, *Don* ...	...	H.	2'	Li.	August ...	Tola, Kálamundi.
LXXV.—POLEMONIACEÆ.						
1. Polemonium.						
cœruleum, *L.* ...	...	H.	3'	Bl.	August ...	Tola, Milam ...
LXXVI.—BORAGINEÆ.						
1. Cordia.						
Myxa, *L.* ...	1	Tr.	40'	...	...	In Bhábar ...
latifolia, *Roxb.* ...	2	Tr.	...	...	March ...	Ditto.
2 Ehretia.						
serrata, *Roxb.* ...	1	Tr.	40'	W	May ...	Outer hills ...
lævis, *Roxb.* ...	2	Tr.	30'	W.	March ...	Bhábar ...
3 Rhabdia.						
viminea, *Dalz.* ...	...	Sh.	6'	Wh.	March ...	Sarju valley ...
4 Heliotropium.						
brevifolium, *Wall.* ...	...	H.	6"	Pk.	July ...	Almora ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	1—7,000	R.	...	...	
Do. ...	6—10,000	R.	...	...	
Do. ...	3—6,000	R.	...	...	
Do. ...	6—7,500	R.	...	...	
Do ...	...	R.	...	...	
Do. ...	12,000	R.	...	...	
Wet open ...	10—12,000	R.	...	...	
Open ...	12,500	R.	...	...	
Do. ...	7, 5—11,500	R.	...	...	
Do. ...	11—12,000	R.	D.	...	
Forest ...	1—3,000	R.	...	...	
Do. ...	1,000	R.	...	...	
Open ...	3—5,500	R.	...	...	
Forest ...	1—2,500	R.	...	...	
River bed ...	2,500	R.	...	...	= *Ehretia* No. 3 in herb. S. & W.
Open ...	5,500	R.	..	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
5. Trichodesma.						
indicum, *R.Br.* ...	...	H.	6″—12″	Pr.	March ...	Outer hills ...
6. Cynoglossum.						
microglochin, *Benth.*	1	H.	3′ - 4′	Bl.	August ...	Rálam valley ..
sp.—— ...	2	H.	3′—4′	Bl.	August ...	Gori valley ...
furcatum, *Wall.* ...	3	H.	3½′	Bl.	June ...	Binsar, Gágar...
sp.—— ...	4	H.	3′	Bl.	August .	Milam ...
Wallichii, *Don* ...	5	H.	2′	Bl.	August ...	Rálam valley ..
furcatum, *Wall.* ...	6	H.	2′—3′	Bl.	March ...	Samkhet ...
sp.—— ...	7	H.	2′	Bl.	June ...	Dhauli valley, ..
micranthum, *Desf.*,	8	H.	2′—3′	Bl.	June ...	Almora ...
sp.—— ...	9	H.	...	...	August ...	Kálamundi ...
sp.—— ...	10	H.	...	...	...	...
sp.—— ...	11	H.	...	...	...	Dudatoli ...
grandiflorum, *Benth.*	12	H.	9″	Bl.	June ..	Patharkori ...
7. Solenanthus.						
sp.—— ...	1	H.	1′	Bl.	August ...	Laptel ...
sp.—— ...	2	H.	2′	Bl.	July ...	Do. Rajpot ..
8. Echinospermum.						
barbatum, *Lehm.* ...	4	H.	9″—12″	Bl.	July ...	Dhauli valley,
glochidiatum, *DC.*	5	H.	2′	Bl.	May ...	Dwáli, Pindari,
sp.—— ...	6	H.	3″	Bl.	May ...	Do. ...
9. Eritrichium.						
sp.— ...	1	H.	2″	Bl.	August ...	Kyungar Pass
rotundifolium, *DC.*	2	H.	3″	Bl.	June ...	Patharkori ..
nemorosum *DC.* ...	3	H.	6″	Wh.	May ...	Dwáli ...
longifolium, *Don* ...	4	H.	3″	...	August ...	Gugé, Milam...
sp.—— ...	5	H.	2″	Wh.	August ...	Rálam ...
sp.—— ...	6	H.	2″	Wh.	August ...	Do. ...
10. Asperugo.						
sp.—— ...	...	H.	2″	Bl.	August ...	Kyungar Pass,
11. Bothriospermum.						
terellum, *Fisch and May.* ...	...	H.	9″	Bl.	February,	Kapkot ...

Plants—(continued).

Conditions of soil, &c.		Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
			Rainy.	Dry.		
Open	...	1—5,500	...	...	...	
Do.	...	8,000	R.	...	...	
Do.	...	6—8,500	R.	...	...	
Woods	..	5—7,500	R.	...	...	
Open	...	11,500		D.	...	
Do.	...	8,500	R.	...	...	
Do.	..	6,500	R.	...	...	
Do.	...	8—11,000	R.	D.	...	
Do.	...	5,000	R.	...	...	
Woods	...	8,500	R.	..	...	
...		...	...	..	...	
Woods	...	8,000	R.	...	...	
Open	...	11,000	R.	...	...	=*Lithospermum* No. 1 in Herb. S. & W.
Do,	...	15,000	...	...	...	
Do.	...	14—15,000	...	...	...	
Do.	...	7—12,000	R.	D.	...	
Do.	..	8—12,500	R.	...	...	
Do.	...	8—12,500	R.	...	...	
Do.	...	16,000	..	...	T.	=*Myosotis* No. 1 in Herb. S. & W.
Do.	...	11,000	R.	...	...	
Woods	...	8,600	R.	...	...	=*Myosotis* No. 4 in Herb. S. & W.
Open	...	15—16,000		D.	T.	=*Echinospermum* No. 3 in Herb. S. & W.
Do.	...	12,000	R.	...	...	
Do.	...	12,000	R.	...	...	
Do.	...	16,500	R.	...	T.	
Fields	...	3,500	...	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
12. Myosotis.						
pallens, *Wall.*	1	H.	6″–8″	Bl.	August	Rálam, Tola
sylvatica, *Hoffm.*	2	H.	1′	Bl.	June	Pindari
13. Lithospermum.						
tenuiflorum, *L.*	2	*H*	...	...	...	...
14. Macrotomia.						
Benthami, *DC.*	1	H.	2½′	Bl.	July	Rálam, &c.
bracteata, *DC.*	2	H.	1′–1½′	Bl.	July	Pindari, Rajhoti.
15. Onosma.						
echioides, *Benth.*	2	H.	...	...	...	...
Emodi, *Wall.*	...	H	2′	Bl. Pr.	September,	Tungnáth
LXXVII.—CONVOLVULACEÆ.						
1 Ipomæa.						
sessiliflora, *Roth*	1	H. Sc.	4′–5′	Pr.	August	Almora
pes-tigridis, *L.*	2	H. Sc.	6′	Pk.	August	Do. &c.
sp. (oxyphylla, *Edgew.*	3	H. Sc.	12′	...	August	Naini Tál
bona-nox, *L.*	...	H. Sc.	12′	Pr.	August	Rámganga valley, &c.
2 Convovulus.						
arvensis, *L*	...	H. Sc.	2′–3′	Pk.	August	Níti
Nil, *L.*	...	H Sc.	3′–4′	Li.	August	Gangoli, &c.
barlerioides, *Ham.*,	...	H.	4′	Pk.	August	Almora
3. Evolvulus						
hirsutus *Ham.*	...	H. cr.	2″–3″	Bl.	All the year.	Almora, &c.
4. Porana.						
paniculata, *Roxb*	1	H. Sc.	20′	W.	March	Outer hills
racemosa, *Roxb.*	2	H. Sc.	15′	W.	September,	Almora
5. Cuscuta.						
macrantha, *Don*	1	H. Sc.	6′	W. Pk.	October	Outer hills
reflexa, *Roxb.*	2	H. Sc.	6′	W	October	Do.
capillaris, *Edgew.*	3	H. Sc.	6″	Pk.	August	Rálam, Níti

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.* Rainy.	*Himálaya.* Dry.	Tibet.	Remarks.
Open	12,000	R.	D.	..	
Near water	11,000	R.	...	...	
...	...	R.	...	...	
Open	11–12,000	R.	...	...	
Do.	12–15,000	R.	D.	T.	
...	...		...	...	
Open	12,000	R.	...	...	= *Maharanga* in Herb. S. & W.
Do.	15,000	R.	...	...	
Do.	14,000	R.	...	...	
Woods	6,000	R.	...	...	
Open	3–5,000	R.	...	...	= *Calonyction speciosum* in Herb. S. & W.
Fields	11,500	R.	D.	...	
Open	5,000	R.	...	...	= *Pharbitis Nil* in Herb. S. & W.
Do.	4,000	R.	...	...	= *Aniseia* in Herb. S. & W.
Do.	1–5,000	R.	...	...	
On bushes	1–4,500	R.	...	...	
Do.	4,500	R.	...	...	
Do.	1–5,500	R.	...	...	
Do.	1–5,000	R.	...	...	
On herbs	11–12,000	R.	D.	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Habit of plant.	Colour of flower.	Time of flowering.	Locality.
LXXVIII.—SOLANACEÆ.						
1. Solanum.						
nigrum, *L.* ...	1	H.	1′	Wh.	March ...	Outer hills ...
xanthocarpum, *Schrad.*, var. Jacquinii ...	2	H.	9″	Pr.	All the year.	Do. ...
lysimachioides, *Wall.*	3	H.	9″	Pr.	August ...	Gori valley ...
verbascifolium, *L.* ...	4	Sh.	12′—15′	Wh.	February,	Bhábar, Bágesar.
indicum, *Nees.* ...	5	Sh.	3′	...	...	Bhim Tál ..
sp.—— ...	6	Sh.	4′	...	...	Alaknanda valley.
sanctum, *L.* ...	7	H	...	...	...	Bhábar ...
sp.—— ...	8	H.	1′	...	...	Outer hills ..
2. Physalis.						
flexuosa, *L.* ...	1	H.	2′—3′	..	February,	Káladhúngi ...
peruviana, *L.* ...	2	H.	6″	Wh.	July ..	Almora ...
3. Datura.						
Stramonium, *L.* ...	1	H.	3′	Wh.	July ...	Almora, Naini Tál.
sp.—— ...	2	H.	4′	Wh.	July ...	Do. ...
4. Scopolia.						
præalta, *Dcne.* ...	...	H.	1′—1½′	Gr. Y.	July ...	Niti, Tisum ...
5. Hyosciamus.						
niger, *L.* ...	...	H.	3′	Pr.	July ...	Malári, &c. ...
6. Nicotiana.						
sp.—— ...	...	H.	...	...	...	Almora ...
LXXIX.—SCROPHULARIACEÆ.						
1. Verbascum.						
Thapsus, *L.* ...	1	H.	3′	Y.	August ...	Kálam, Milam
var.—— ...	2	H.	3′—5′	Y.	June ...	Naini Tál, ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.* Rainy.	*Himalaya.* Dry.	Tibet.	Remarks.
Open ...	1—7,000	R.	...	...	
Do. ...	1—5,000	R.	...	...	
Do. ...	4—,5000	R.	..	...	
Do. ...	1—3,500	R.	...	...	
Do. ...	5,000	R.	...	...	
Banks ..	4,500	R.	...	...	
Open ...	1,000	R.	...	...	
Do. ...	4,000	R.	...	...	
Do. ...	1,000	R	...	...	
Do. ...	5,500	R.	...	...	
Do. ...	5—7,500	R.	...	...	
Do. ...	5,000	R.	...		
Do. ...	11,5—15,000	...	D.	T.	
Do. ...	10—11,000	...	D.	...	
Cultivated ...	1—5,000	R.	...	...	
Open ...	12,000	R.	D.	...	
Do. ...	5—8,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
2 Celsia						
coromandeliana, *Vahl.*	...	H.	2′—3′	Y.	May ...	Bágesar ...
3. Linaria.						
ramosissima, *Wall.* ..	...	H.	6″—9″	Y.	All the year.	Almora, &c. ...
4. Antirrhinum						
Orontium, *L.* ..	...	H.	1′—2′	Pk Y.	March ..	Do. ...
5 Scrophularia.						
decomposita, *Royle.* ..	1	H.	2′	...	July ..	Milam ...
variegata, *Rich.* ..	2	H.	2′—3′	...	June ...	Malári, &c. ...
obtusa, *Edgew.* ...	3	H.	2′	..	Do. ...	Almora ...
himalaiensis, *Royle*...	4	H.	4′—5′	...	July ...	Naini Tál ...
Edgeworthii, *Benth.*	5	H.	3′	Pr. Gr.	August ...	Sába ...
calycina, *Benth.* ..	6	H.	1′	...	June ..	Pindari, Pa-tharkori.
sp.—— ...	7	H.	1′—1½′	...	July ...	Laptel ...
6. Mimulus.						
gracilis, *R. Br.* ...	...	H.	1½′	..	April ...	Lodh ..
7. Mazus.						
dentatus, *Wall.* ...	1	H.	6″—9″	Pk.	August ..	Betuli Pass ...
rugosus, *Lour.* ...	2	H.	6″	Pr.	March ...	Almora ..
surculosus, *Don* .	3	H.	6″	Pr.	Do. ...	Kapkot ...
8. Lindenbergia.						
urticæfolia, *Lehm.* ...	1	H.	6″	Y.	August ...	Jagesar, &c. ...
grandiflora, *Benth.* ...	2	H	1′	Y.	January ...	Bágesar, &c. ...
macrostachya, *Benth.*,	3	H.	2′—3′	Y.	March ...	Kálapathar ...
9. Limnophila.						
menthastrum, *Benth.*,	1	H.	6″	...	July ...	Almora ...
Roxburghii, *G. Don*,	2	H.	4″	...	February...	Pátli Dún ...
hypericifolia, *Benth.*,	3	...	+	...	...	...
10. Herpestis.						
Monnieria, *H B.K.* ...	...	H.	6″	Li.	August ...	Bhábar, Rámganga valley.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himálaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	1—3,000	R.	...	...	
Banks ...	1—5,500	R.	...	...	
Fields ...	1—5,000	R.	...	...	
Open ...	13,000	...	D.	...	
Do. ...	10,500	...	D.	...	
Do. ...	5-7,000	R.	...	...	
Woods ...	6-7,000	R.	...	...	
Open ...	8,500	R.	...	...	
Do. ...	10—12,000	R.	...	...	
Do. ...	15,000	...	...	T.	
Do. ...	5,000	R.	...	...	
Wet rocks ...	8,000	R.	...	...	
Open ...	1—5,000	R.	...	...	
Do. ...	3-9,500	R.	...	...	
Shady banks ...	1—7,000	R.	...	...	
Do. ...	3—5,000	R.	...	...	
Open ...	1—2,000	R	...	...	
Wet ...	4,000	R.	...	...	
Do. ...	...	...	...	...	
...	...	...	...	...	
Do. ...	1—5,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom.)	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
11. Dopatrium.						
junceum, *Ham.* ...	...	H.	9"	...	...	...
12. Torenia.						
edentula, *Griff.* ...	...	H.	1"—2'	Pr.	September,	Naini Tál, Sarju valley.
13. Vandellia.						
crustacea, *Benth.* ...	1	H.	2"	Pk.	July ...	Almora ...
pedunculata, *Benth.*...	2	H.	12"	Bl.	July ...	Do. ...
nummularifolia, *Don*,	3	H.	3"—4"	Pk,	August ...	Naini Tál ...
14. Bonnaya.						
brachiata, *Link.* ...	...	H.	3"	Pk.	July ..	Almora, &c. ...
15. Hemiphragma.						
heterophyllum, *Wall.*,	...	H. cr.	6"	...	May ...	China, Dhákuri Pass.
16. Picrorhiza.						
Kurrua, *Royle.* ...	1	H.	6"	Br. Pr.	Do. ...	Mádhári Pass...
sp.—— ...	2	H.	9"	...	July ...	Milám ...
17. Wulfenia.						
Amherstiana, *Benth.*...	...	H.	8"	Bl.	June ...	Binsar ...
18. Veronica.						
Anagallis, *L.* ...	1	H.	1'—2'	Pk.	March ...	Rámgar, &c. ...
laxa, *Benth.* ...	2	H.	6"—9"	Bl.	May ...	Dwáli ...
ciliata, *Fisch.* ...	3	H.	3"—4"	Bl.	August ...	Barjikáng Pass,
sp.—— ...	4	H.	6"	Bl.	September,	Milam, Topidhunga.
serpyllifolia, *L.* ...	5	H.	2"—6"	Bl.	August ...	Kálam ...
cana, *Wall* ...	6	H.	6"	Bl.	Do. ...	Sába ...
agrestis, *L.* ...	7	H.	6"—9"	Pk.	March ...	Almora ..
Maddeni, *Edgew.* ...	8	H.	4"	Bl.	Do. ...	Do., Naini Tál.
biloba, *L* ...	9	H.	6"	Bl.	March ...	Naini Tál, Milam.
capitata, *Royle* ...	10	H.	3"—4"	Bl.	August ...	Barjikáng Pass
lanosa, *Benth.* ...	11	H.	1'	Bl.	July ...	Niti ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.* Rainy.	*Himalaya.* Dry.	Tibet.	Remarks.
...	..	R.	...	...	
Wet	4 7,000	R.	..	..	
Do.	4,000	R.	...	...	
Do.	4,000	R.	..	...	
Shady damp	5—6,000	R.	..	.	
Open	5,500	R.	..	...	
Do.	7,5—11,000	R.	...	...	
Do.	10 12,000	R.	.	...	
Do.	12,000	R.	D.	...	
Woods	7—10,000	R,	...	...	
Wet	5—6,500	R.	...	...	
Open	8,500	R.	...	...	
Do.	13,500	R.	...	...	
Do.	13—15,000	...	D.	T.	
Do.	12,000	R	...	...	
Woods	9—10,500	R.	...	...	
Walls	5,000	R.	...	...	
Open	5—7,500	R.	...	...	
Do.	5—13,000	R.	D.	...	
Do.	13,500	R.	...	...	
Do.	10—13,000	...	D.	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
19.—Buchnera.						
hispida, *Ham.*	1	H.	1'	Bl.	October	Gopesar, Almora.
sp.——	2	H.	1'	Bl.	Do.	Almora, &c.
20.—Striga.						
euphrasioides, *Benth.*,	1	H.	6"	W.	August	Tejam, &c,
hirsuta, *Benth.*	2	H.	6"	Y.	Do.	Gangoli, &c.
21.—Centranthera.						
hispida, *R.Br.*	...	H.	6"	Pr.	July	Almora
22.—Sopubia.						
trifida, *Ham.*	...	H.	2'	Y.	August	Do.
23.—Leptorhabdos.						
parviflora, *Benth.*	...	H.	2'—3'	...	Do.	Gágar, Binsar,
24.—Euphrasia.						
officinalis, *L.*	...	H.	3"—9"	Y. W.	June	Dhákuri-bináya, &c.
25.—Pedicularis.						
megalantha, *Don*	1	H.	1'—2'	Pr.	August	Kálimundi, Milam.
Ditto	7	H	6"	R.	Do.	Rálam
gracilis, *Wall.*	2	H.	1'—2'	Pr.	Do.	Girgaon, Pitti river.
Ditto	11	A.	9"	R.	Do.	Gothing
carnosa, *Wall.*	3	H.	6"—12"	R.	August	Naini Tál, Almora.
siphonantha, *Don*	4	H.	6"	R.	Do.	Rálam
pectinata, *Wall.*	5, 15	H.	3'	R.	Do.	Sába
tubiflora, *Fisch.*	6	H.	4"	Y.	Do.	Milam, valleys of Gugé.
verticellata, *Wall.*	8	H.	4"—6"	R.	Do.	Barjikáng Pass.
versicolor, *Wall.*	9	H.	6"	R.	May	Pindari
Ditto	13	H.	4"—9"	Br. Y.	September.	Rimkin, Balchha Pass.
Hookeriana, *Wall.*	10	H.	4"—6"	R.	June	Rogi-la.
rhinanthoides, *Schrenk.*	12, 13	H.	6"	R.	September,	Balchha Pass
sp.——	14	H.	3"	R.	Do.	Do.

Plants (continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himálaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Open	3—5,000	R.	...	...	
Do.	4,000	R.	...	...	
Do.	4,000	R.	...	...	
Do.	4—5,000	R.	...	...	
Wet	3—4,000	R.	...	...	
Open	5—6,500	R.	...	...	
Do.	6—8,000	R.	...	...	
Do.	8—12,000	R.	D.	...	
Do.	7—11,500	R.	D.	...	
Do.	12,000	R.	...	...	
...	...	...	...	...	
Do.	12,500	...	D.	...	
Do.	5—7,000	R.	...	...	
Do.	12,000	R.	...	...	
Do.	8—9,000	R.	...	...	
Do.	11—15,000	...	D.	T.	
Do.	14,700	R.	...	...	
Do.	10,500	R.	...	...	
Do.	13—16,500	...	...	T.	
Do.	11,000	R.	...	...	
Do.	13—16,500	...	...	T.	
Do.	16,500	...	...	T.	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
LXXX.—OROBANCHACEÆ.						
1.—Æginetia.						
indica, *Royle.*	...	H.	1′	Br. Pr.	August	Kapkot, Bhimtal.
2.—Orobanche.						
indica, *Wall.*	1	...	9″—12″	...	March	Hardwár
sp. —	2	..	6″—9″	...	May	Dwáli, Ramni,
sp. —	3	...	2′	...	July	Tola
epithymum, *DC.*	4	...	6″—8″	...	July	Rálam, Milam,
LXXXI.—PLUMBAGINACEÆ.						
1.—Plumbago.						
zeylanica, L.	...	Sh.	4″—5″	Pk.	March	Bhábar, Bágesar.
LXXXII.—GESNERACEÆ.						
1.—Æschynanthus.						
ramosissima, *Wall.*	...	H. sc	1′—1½′	Sc.	August	Mohargári
2.—Lysionotus.						
ternifolia, *Wall.*	...	H.	9′—15′	Pr.	Do.	Bágesar
3.—Rhynchoglossum.						
obliquum, *DC.*	...	H.	1′—1½′	Pr. Bl.	October	Outer hills
4.—Platystemma						
violoides, *Wall.*	...	H.	3″	Bl.	August	Naini Tál
5.—Didymocarpus.						
lanuginosa, *Wall.*	1	H.	3″	Pr.	Do	Almora
macrophylla, *Wall.*	2	H.	9″	Pr.	Do.	Mohargári, Bágesar
subalternans, *Wall.*	...	H.	1′	Pr.	Do.	Dyári Pass, Ramni.
6.—Chirita.						
bifolia, *Don*	1	H.	4″	Pr. Y.	Do.	Outer hills
Edgeworthii, *DC.*	2	H.	6″	Pr.	Do.	Gangoli, &c.

Plants— (continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himalaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	3—4,000	R.	...	...	
Fields ...	1,000	R.	...	...	
On trees ...	8—10,000	R.	...	...	
Fields ...	11,500	...	D	...	
On Thymus ...	12—13,000	R.	D	...	
Woods ...	1—3,000	R.	...	...	
Trees ...	4,000	R.	...	...	
Trees & banks,	2,5—4,000	R.	...	...	
Shady banks ...	1,5—4,500	R.	...	...	
Trees & rocks.	6—8,500	R.	...	...	
Dry rocks ...	5,000	R.	...	...	
Wet rocks ...	3—5,500	R.	...	...	
Do. ...	6,5—8,500	R.	...	...	
Shady banks ...	2—5,000	R.	...	...	
Do. ...	4—5,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
LXXXIII.—BIGNONIACEÆ.						
1.—Calosanthes.						
indica, *Bl.* ...	...	Tr	...	...	...	Bhábar and outer hills.
2.—Stereospermum.						
suaveolens, *DC.* ...	...	Tr.	...	...	...	Bhábar ...
3.—Amphicome.						
Emodi, (*Royl*) ...	1	H.	6"	Pr.	March ...	Deoprayág ...
arguta, (*Royle*) ..	2	S. H.	1'—1½'	Pr.	July ...	Dhauli valley,
LXXXIV.—PEDALINEÆ.						
1.—Sesamum.						
indicum, *L* ...	...	H.	3'—4'	...	Do. ...	Bhábar, Almora.
LXXXV.—ACANTHACEÆ.						
1.—Thunbergia.						
coccinea, *Wall.* ...	...	Sh.	10'—15'	Sc.	December,	Baliya bridge, Harara.
2.—Hygrophila.						
polysperma, *T. Anders.*	...	H	...	...	...	Mohan ...
3.—Ruellia.						
hirta, *Vahl.* ..	...	Sh.	2'	Bl.	March ...	Outer hills ...
4.—Petalidium						
barlerioides, *Nees* ...	...	Sh.	6'	Wh.	February,	Bhábar ...
5.—Strobilanthes.						
Edgeworthianus, *Nees*,	1	Sh.	3'	Bl.	December,	Kota Dún ...
auriculatus, *Nees* ...	2	Sh	3'	Bl.	Do ...	Do. ...
glutinosus, *Nees* ..	3	Sh.	2'—3'	Li.	February,	Kapkot ...
Wallichii, *Nees* ...	4	H.	2'	Bl.	August ...	Kúr Pass ...
alatus, *Nees* ...	5	H.	3'	Bl.	Do. ...	Diyari Pass ...
attenuatus, *Jacq.* ...	6	H.	3'	Pr.	Do. ...	Loháthat ...
sp.—— ...	7	H.	2'	Pr.	Do. ...	Tunghási ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himá-laya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Forest ...	1—3,000	...	...	...	
Do. ...	1...3,000	...	...	...	
Open ...	1,500	R.	...	...	
On rocks ...	7,000	R	...	...	
Open and cultivated	1—5,500	R.	...	...	
Forest ...	2,500	R.	...	...	= *Hexacentris* in Herb. S. & W.
...	2,000	R.	...	...	= *Hemiadelphis* in Herb. S. & W.
Shady woods ...	1—5,000	R.	...	...	
Forest ...	1,500	R.	...	...	
Do. ...	2.000	R.	...	...	
Do. ...	2,000	R.	...	...	
Woods ...	3—6,000	R.	...	...	
Open ...	11,000	R.	...	...	
Woods ...	6—7,000	R.	...	...	
Open ...	6,000	R.	...	...	
Woods ...	9,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
6.—Goldfussia.						
capitata, *Nees* ...	1	H.	3′	Bl	August ...	Kálimundi ...
bracteata, *Nees* ..	2	H.	3′	Pr.	August ...	Mohargári ...
penstemonoides, *Nees*.	3	H.	3′	Li.	August ...	Naini Tál ...
divaricata, *Nees* ...	4	H	3′	...	August ...	?
7.—Æchmanthera.						
Wallichii, *Nees* ...	...	Sh.	8′—10′	Bl.	August ...	Sarju valley ...
8.—Barleria.						
dichotoma, *Roxb.* ..	1	H.	2′	Pr	August ...	Gangoli ...
cristata, *L.* ...	2	H.	3′	Pr.	September,	Bágesar ...
var.—— ..	4	H.	2′	Pr.	September,	Kálápathar- ...
cilialata, *Roxb.* ...	3	H.	2′	Pr.	September,	Outer hills ...
nepalensis, *Nees* ...	5	H.	3′	Wh	September,	Satráli ...
9.—Asystasia.						
macrocarpa, *Nees* ...	...	H.	3′—4′	Pr.	October ...	Kota Dún ...
10.—Eranthemum.						
nervosum, *R.Br.* ...	...	Sh.	3′	Bl.	March ...	Outer hills ...
11.—Phlogacanthus.						
thyrsiflorus, *Nees* ...	...	Sh,	3′—4′	Or. Br.	Marrh ...	Kota Dún
12.—Lepidagathis.						
cuspidata, *Nees* ...	1	Sh	1′—2′	Wh. Pr.	March ...	Outer hills ...
ustulata, *Nees* ...	2	Sh.	1′—2′	Wh	March ...	Do. ...
purpuricaulis, *Nees* ...	3	Sh.	1′—2′	Wh.	March ...	Do. ...
hyalina, *Nees* ...	4	H.	1′	Wh.	March ...	Do. ...
13.—Justicia.						
micrantha, *Wall.* ...	...	H.	9″	Li.	August ...	Rámari ...
procumbens, *L.* ...	...	H.	6″—9″	Pk.	March ..	Outer hills ...
Adhatoda, *L.* ...	...	Sh	8′—10′	Wh.	March ...	Plains, Bágesar,
14.—Rungia.						
parviflora, *Nees* ...	...	H.	3″—4″	Bl.	March ...	Sirmoria ...

Plants—(continued).

Conditions of soil, &c.,	Elevation in feet above the sea.	*Himalaya.* Rainy.	*Himalaya.* Dry.	Tibet.	Remarks.
Woods ...	8,500	R.	...	...	
Do. ...	6,500	R.	...	..	
Do. ..	7,000	R.	...	...	
Do. ...	.	...	.	...	
Open ...	4,000	R.	...	...	
Do. ...	3—5,000	R.	..	...	
Do. ...	3,000	R	...	...	
Do. ...	2—6,000	R	.	...	
Do. ..	3,—5,000	R.	...	...	
Do. ...	4,000	R	...	...	
Shady banks ...	7,000	R.	...	...	
Woods ...	1—4,000	R.	...	...	
Forest ...	1,5—3,000	R	...	...	
Open ..	2—5,000	R.	...	...	
Do. ...	2—4,000	R.	...	...	
Do ..	2—4,000	R.	...	...	
Do.	2—4,000	R	...	...	
Shady banks ...	4,500	R	...	...	= *Rostellaria* No. 2 in Herb. S. & W
Open ...	3—5,000	R.	...	...	= *Rostellaria* No. 2 ditto ditto.
Do. ...	4—5,000	R	...	...	= *Adhatoda vasica* ditto ditto.
Do. ...	4,000	R	...	...	

Name.	He[illegible] number [illegible]y and Win-[illegible]m.).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
15 Dicliptera.						
bupleuroides, *Nees* ...	...	H.	2′	Pk.	...	Outer hills ...
16. Peristrophe						
speciosa, *Nees* ...		H. Sh	3′—4′	Pk.	February,	Outer hills, Bágesar
sp —— ...		H. Sh	2′	Sc	August ..	Gangoli ...
LXXXVI.—SELAGINACEÆ.						
1 Gymnandra.						
kunawarensis, *Royle*	...	H.	6″—9″	Bl.	July ..	Ráj-hoti, Rákas Tál.
LXXXVII.—VERBENACEÆ						
1. Phryma.						
leptostachya, *L.* ...	...	H.	2′	Pk	August ..	Naini Tál, &c.,
2. Lantana.						
alba, *Mill.* ...	...	Sh.	4′	Wh.	March ..	Outer hills ...
3. Lippia.						
nodiflora, *Rich.* ..	...	H. cr.	1′	Pr. Br.	March ..	Kálápathar, &c.
4. Verbena.						
officinalis, *L.* ..	...	H.	2′	Li.	March ..	Outer hills ..
5 Callicarpa.						
macrophylla, *Vahl.* ...	1	Sh.	10′	Li.	August ...	Outer hills, Bágesar.
arborea, *Roxb.* ...	2	Tr.	20′—30	...	May ..	Do. do. ...
6. Premna.						
herbacea, *Roxb.* ...	1	H.	2″—3″	W. Y.	May ..	Bágesar ...
interrupta, *Wall.* ...	2	Sh.	20′—30′	Wh.	May ...	Supi ...
barbata, *Wall* ...	3	Tr.	25′	Wh.	May ...	Bhábar, Bágesar.
integrifolia, *L.* ..	4	...	...	Wh.	...	Do. ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himálaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Woods ...	2—4,000	R.	...	...	
Shady woods ..	1—3,000	R.	...	...	
Open ...	4—5,000	R	...	...	
Wet open ...	15—16,000	...	...	T.	
Damp woods ..	6—7,500	R.	...	...	
Open ...	1—3,500	R.	...		
Wet ..	2—4,000	R.	..	...	
Open ...	1—6,000	R.	...	...	
Do ...	1—4,000	R.	...	...	
Do. ...	1—3,000	R.	..	...	
Do. ...	3,000	R	...	...	
Do ...	4—6,000	R.	...	...	
Forest ...	1—3,500	R	...	...	
Do ...	1,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
7. Gmelina.						
arborea, *Roxb.* ...	...	Tr.	40'—50'	Y.	March ...	Bhábar ...
8. Vitex.						
Negundo, *L.* ...	...	Sh	10'—15'	Pr.	April ...	Bhábar, outer hills.
9. Clerodendrum.						
infortunatum, *L.* ...	1	Sh.	6'	Pk.	February,	Bhábar ...
gratum, *Wall.* ...	2	Sh.	6'	Sc. W.	March ...	Naini Tál, outer hills.
serratum, *Spreng.* ...	3	H.	3'	Pr.	June ...	Bágesár ...
10 Holmskioldia.						
sanguinea, *Retz.* ...	...	Sh.	15'	Sc.	December,	Kálápathar ...
11. Caryopteris.						
Wallichiana, *Schauer.*,	...	Sh.	10'—12'	Pk.	February,	Bhábar, Bágesar.
LXXXVIII.—LABIATÆ.						
1. Geniosporum.						
strobiliferum, *Wall*,	...	H.	1½'	Pr.	August ...	Sarju valley ...
2. Orthosiphon.						
virgatus, *Benth.* ...	1	H.	1'	...	May ..	Bágesar ...
rubicundus, *Benth.* ...	2	...	1'	Pk.	August ...	Kosi valley ...
3. Plectranthus.						
ternifolius, *Don* ...	1	H.	3'—4'	...	October ...	Bhábar, Sarju valley.
rugosus, *Wall.* ...	2	Sh	4'	...	...	Naini Tál ...
Coetsa, *Don* ...	3	H.	3'	Li.	February,	Kota Dún, Almora.
cordifolius, *Don* ...	4	H.	3'	Bl.	...	Almora ...
scrophularioides, *Wall.*	5	H.	3'—4'	W. Y.	August ...	Kálimundi ...
Gerardianus, *Benth.* ...	6, 10	H.	1'—3'	Wh.	October ...	Gori valley, Almora.
Maddeni, *Benth.* ...	7	H.	4'	Li.	August ...	Kálimundi ...
Striatus, *Benth.* ...	8	H.	2'	...	...	Almora ...
Stracheyi, *Benth.* ...	9	H.	1½'	Li.	October ...	Sarju valley ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himá-laya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Forest ...	1,500	R.	...	...	
Open ...	1—4,000	R.	...	...	
Forest ...	1,500	R	...	..	
Woods ...	4—6,500	R	...	...	
Open ...	3—4,000	R.	...	...	
Woods ...	2—3,000	R.	...	...	
Do. ...	1—3,000	R.	...	...	
Open ...	4,000	R.	...	...	
Do. ..	3,000	R.	...	...	
Do. ...	4,000	R.	..	...	
Do. ...	1—3,000	R.	...	...	
Do. ...	5—7,000	R.	...	...	
Do ...	2—6,000	R.	...	...	
Do ...	5,500	R.	...	...	
Woods ...	8,700	R.	...	...	
Woods & Open,	5—7,000	R.	...	...	
Woods ...	8—9,000	R	...	...	
Open ...	5,000	R.	...	...	
Wet places ...	4,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
4. Coleus.						
barbatus, *Benth.* ..	...	H.	2′	Bl.	...	Almora ...
5. Anisochilus.						
carnosus, *Wall.* ..	...	H.	1′	...	November,	Byás-ghát ...
6. Pogostemon						
plectranthoides, *Desf*	1	Sh.	5′	...	March .	Bhábar ...
parviflora, *Benth* ..	2	Sh.	10′–15′	Pr	May ..	Kapkot ...
7. Dysophylla.						
cruciata, *Benth* ...	...	H.	2′	...	...	Almora ..
8. Colebrookia.						
oppositifolia, *Sm.* ...	...	Sh.	8″—12″	Wh.	March ...	Bágesar ...
9. Elscholtzia.						
polystachya, *Benth.* ...	1	Sh.	4′–8′	Wh.	September,	Naini Tál ...
eriostachya, *Benth* ...	2	H.	1′–1½′	Y.	August ...	Milam, Rálam,
densa, *Benth.* ...	3	H.	1′—1½′	Y.	August ..	Rálam ..
strobilifera, *Benth* ...	4	H.	2′	Y.	August ...	Naini Tál, &c.,
pusilla, *Benth.* ...	5	H.	4″—6″	?	August ...	Topidhunga ...
flava, *Benth* ...	6	Sh.	8′—10′	Y.	September.	Tun-hasi ...
incisa, *Benth.* ...	7	H.	1′—1½′	Y.	August ...	Bhainskhet ...
pilosa, *Benth.* ...	8	H.	3′	Bl.	October ..	Sarju valley ...
cristata, *Willd.* ...	9	H.	3′	...	October ..	Jalat ...
sp.—— ...	10	H.	1′	...	October ...	Sarju valley ...
10 Perilla.						
ocymoides, *L.* ...	...	H.	2′	Wh.	August ...	Bhábar, Dwáli,
11. Mentha.						
sylvestris, *L.* ...	...	H.	2′	Pk.	August ...	Niti ...
12. Origanum.						
normale, *Don* ...	1	H.	2′	Pk.	August ...	Almora ...
vulgare, *L.* ...	2	H.	2′	Pk.	August ...	Milam ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.* Rainy.	*Himálaya.* Dry.	Tibet.	Remarks.
Open ...	4—5,500	R.	...	...	
Do ...	1,500	R.	...	...	
Forest ...	1—3,000	R.	...	...	
Open ...	3,500	R	...	...	
Wet, open ...	5,000	R.	...	...	
Open ...	1—5,500	R.	...	...	
Open ...	6—9,500	R.	...	...	
Do. ...	12—13,000	R	D.	...	
Do. ...	10—12,000	R.	D.	...	
Do. ...	8—10,000	R	...	...	
Do. ...	15,000	...	...	T.	
Do. ...	5,500 —9,500	R.	...	...	
Banks ...	4—6,500	R	...	...	
Open ...	4,000	R.	...	...	
Woods ...	6—7,000	R	...	...	
...	4,000	R.	...	...	
Cultivated ...	1,5—8,500	R.	...	...	
Open ...	11,500	...	D.	...	
Do. ...	5,900	R.	...	...	
Do. ...	11,500	...	D.	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
13. Thymus.						
Serpyllum, *L.* ...	1	H.	4"—5"	Pk.	August ...	Rálam, Rajhoti,
linearis, *Benth.* ...	2	H.	4"—5"	Pk.	March ...	Almora ...
14. Micromeria.						
biflora, *Benth.* ...	...	H.	6"—8"	Pk.	August ...	Almora ...
15. Hedeoma.						
nepalensis, *Benth.* ...	...	H.	2'	...	August ...	Almora ...
16. Calamintha.						
Clinopodium, *Benth.*	1	H.	1'	Bl.	August ...	Rálam ...
umbrosa, *Benth.* ...	2, 3	H.	2'	Bl.	August ...	Naini Tál, Almora.
17. Melissa.						
flava, *Benth.* ...	1	H.	2'	Y. Bl.	June ...	Binsar ...
parviflora, *Benth.* ...	2	H.	2'	...	August ...	Rámganga and Gori valley.
18. Salvia.						
lanata, *Roxb.* ...	1	H.	6"—12"	Bl.	March ...	Almora, &c. ...
campanulata, *Wall.* ...	2	H.	3'	Bl.	June ...	Dwáli, Dugli ...
glutinosa, *L.* ...	3	H.	3'	Y.	August ...	Niti ...
sp.—— ...	4	H.	4'	Bl.	August ...	Naini Tál ...
plebeia, *Br.* ...	5	H.	1½'	Bl.	March ...	Outer hills ...
lanceolata, *Willd.* ...	6	H.	1'	Bl.	August ...	Hawalbágh ...
19. Nepeta.						
ruderalis, *Ham.* ...	1	H.	2½'	...	February,	Hardwár, outer hills.
spicata, *Benth.* ...	2	H.	2'	Pr.	February,	Milam, Rálam,
campestris, *Benth.* ...	3	H.	3'	Pr.	August ...	Jalat ...
graciliflora, *Benth.* ...	4	H.	1'	...	February,	Hardwár ...
Govaniana, *Benth.* ...	5	H.	4'	Y.	August ...	Rálam valley,
leucophylla, *Benth.* ...	6	H.	2'	...	...	Naini Tál ...
elliptica, *Royle* ...	7	H.	2'	Li.	September,	Do ...
discolor, *Royle* ...	8	H.	1'—1½'	...	August ...	Milam, Niti, Pass
supina, *Stev.* ...	9,10	H.	1½'	Bl.	September,	Rákas Tál ...
tibetica, *Benth.* ...	11	H.	3"—6"	Bl.	August ...	Kyungar Langar
longibracteata, *Benth.*	12	H.	6"	Li.	September,	Balchha Pass ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.* Rainy.	*Himalaya.* Dry.	Tibet.	Remarks.
Open ...	12—15,000	R	D.	T.	
Do. ...	5- 8,000	R	..	...	
Do. ...	5—7,000	R.	...	...	
Near water ...	4,500	R	...	...	
Open ..	10,000	R.	..	..	
Do. ..	5- 8,000	R	...	..	
Woods ...	7,500	R	...	..	
Do. ...	5—6,500	R	...	..	
Open ...	4—8,000	R	...	...	
Open woods ...	10—11,000	R	...	...	
Open ...	7—11,000		D.	..	
Do. ..	7,000	R	...	...	
Do ...	1—5,000	R.	...	...	
Naturalized ...	4,000	R	...	...	
Open ...	1—5,000	R.	...	...	
Do. ...	8,5—12,000	R.	D.	...	
Do. ...	7,000	R.	...	..	
Do. ...	1,000	R.	.	...	
Do. ...	8,500	R.	..	...	
Do. ...	6,500	R.	...	...	
Do. ...	7,700	R.	...	...	
Do. ...	11—15,000	...	D.	T.	
Do. ...	15,500	...	..	...	
Do. ...	15—15,500	...	...	T.	
Do. ...	17,000	.	...	T.	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
20. Dracocephalum.						
acanthoides, *Edgew.*,	1	H.	6″	Y.	August ...	Kyungar ...
speciosum, *Benth.* ...	2	H.	9″	Bl.	August ...	Kalájawar ...
21. Scutellaria.						
discolor, *Colebr.* ...	1	H.	6″	Pk.	August ..	Jágesar ...
linearis, *Benth.* ...	2	H.	4″	Rk. Y.	March ...	Almora ...
angulosa, *Benth.* ...	3	H.	1′—1½′	Pk. Y.	March ...	Almora, Naini Tál
sp.—— ...	4	H.	2′	Pk	March ...	Do. ..
repens, *Ham.* ...	5	H.	2′—3′	Pr.	March ..	Kota Dún ...
prostrata, *Jacq.* ..	6	H.	6″	Pr Y.	August ...	Milam ..
grossa, *Wall* ...	7	H.	3′	Bl.	August ...	Gágar Pass ...
22. Brunella.						
vulgaris, *L.* ...	...	H.	6″—9″	Pr.	August ...	Naini Tál, &c.,
23 Marrubium.						
lanatum, *Benth.* ...	...	H.	6″	Br.?	August ...	Shelshel ...
24 Craniotome.						
versicolor, *Reich.* ...	...	H.	2′	Pk, W.	September,	Almora, &c. ...
25. Anisomeles.						
ovata, *Br.* ...	...	H.	2′—4′	Bl.	August ..	Almora, &c. ...
26. Colquhounia.						
vestita, *Wall.* ...	...	Sh.	4′—8′	Sc.	June ...	Naini Tál, Gori valley.
27. Stachys.						
sericea, *Wall.* ...	1	H.	2′	Li.	July ...	Almora ...
splendens, *Wall.* ...	2	H.	2′—3′	Li.	July ..	Naini Tál ...
28. Leonurus.						
Cardiaca, *L.* ...	...	H.	2′—3′	Wh.	June ...	Naini Tál ...
29. Lamium						
amplexicaule, *L.* ...	1	H.	9″	Pr.	March ...	Almora, Naini Tál,
petiolatum, *Royle* ...	2	H.	1′—1½′	Wh.	May ...	Naini Tál, Sába.
rhomboideum, *Benth.*,	3	H.	9″	Wh.	September,	Kyungar, &c....
sp ?—— ..	4	H.	6″	...	June ...	Sagtia-deo ...
30 Roylea						
elegans, *Wall.* ...	...	Sh.	6′—8′	Br.	March ...	Almora, Naini Tál.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open	15,500	...	D.	T	
Do.	14,000	R.	...	...	
Banks	4,5—6,500	R.	...	...	
Open	5,400	R.	...	...	
Do	4—8,000	R.	...	...	
Do	5,000	R.	...	...	
Wet shady, banks.	2,000	R.	...	...	
Open	11,500	...	D.	...	
Woods	6 8,000	R.	D.	..	
Open	6—10,000	R.	...	...	
Do.	16,000	...	...	...	
Banks	5—7,000	R.	...	...	
Open	1—6,000	R.	..	.	
Do.	6—8,000	R.	...	...	
Do.	6 8,000	R.	..	..	
Woods	7—8,000	R.	...	...	
Do.	6,5—8,000	R.	...	..	
Open	5,000	R.	...	...	
Do.	7—9,000	R.	...	...	
Do.	13—15,000	...	D.	T.	
Do	11,500	R.	...	...	
Do.	5,000	R	..	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
31 Leucas.						
hyssopifolia, *Benth.* ...	1	H.	1′	Wh.	May ...	Bágesar, &c. ...
cephalotes, *Spreng.* ...	2	H.	1′	Wh.	August ...	Háwalbágh, &c.
lanata, *Benth* ...	3	H.	6″—8″	Wh.	May ...	Almora ..
mollissima, *Wall.* ..	4	H.	1′	Wh.	May ...	Almora, Naini Tál.
32. Leonotis.						
nepetæfolia, *Br.* ...	...	H.	2′—3′	Sc.	January ...	Bhábar ...
33. Phlomis.						
macrophylla, *Wall.* ..	...	H.	4′	Br. Pr.	August ...	Rálam valley ...
bracteosa, *Royle* ..	...	H.	2′	Pr.	July ...	Sagtia-deo ...
34. Teucrium.						
macrostachyum, *Wall.*	1	Sh.	5′—10′	Pr.	October ...	Gori valley ...
quadrifarium, *Ham.* ...	2	H.	2′—3′	Li.	August ...	Naini Tál, &c.,
Royleanum, *Wall.* ...	3	H.	2′—3′	Wh.	August ..	Almora? ...
laxum, *Don* ...	4	H.	1′	Pk.	February,	Rámganga valley.
35. Ajuga.						
bracteosa, *Benth.* ..	1	H.	3″—9″	Pk.	March ..	Almora, &c. ...
Do —— ...	2	H.	6″—8″	Pk.	March .	Háwalbágh ...
Do. —— ..	3	H.	2′—3′	Bl.	February,	Kota Dún ..
Do —— ...	4	H.	1½″—2″	Y. P.	May ..	Pindari ...
Do. —— ..	5	H. cr	2″	...	May ...	Lahur ..
LXXXIX.—PLANTAGINACEÆ.						
1. Plantago.						
asiatica, *L.* ...	1	H.	6″	...	July .	Naini Tál, &c.,
Do —— ...	2	H.	4″—5″	...	June ..	Madhári Pass,
Do. —— ...	3	H.	5″	...	July ...	Niti ...
Do. —— ..	4	H.	1′—2′	...	May ...	Naini Tál, &c.,
Do —— ...	5	H.	1′	...	August ...	Rálam valley ...
XC.—NYCTAGINACEÆ.						
1. Bœrhaavia.						
sp. —— ..	1	H.	2′—3′	Pk.	July ...	Joshimath, Jelam
sp. —— ..	2	H.	2′—3′	Pk.	July ...	Tapuban ...
diffusa, *L.* ...	3	H.	2′—3′	Pk.	January ...	Kaláthúngi ...
XCI.—AMARANTACEÆ.						
1. Deeringia.						
baccata, *Moq.* ..	.	Sh.	20′	...	October ...	Jyari ...

Plants—(continued).

Condition of soil, &c.	Elevation in feet above the sea.	*Himálaya.* Rainy.	*Himálaya.* Dry.	Tibet.	Remarks.
Open ...	3—4,000	R.	...	...	
Fields ...	1—4,000	R.	...	...	
Open ...	4—5,000	R.	...	...	
Do. ...	5—6,000	R.	...	...	
Cultivated ...	1—2,000	R	...	...	
Open ...	10,000	R.	...	...	
Do ...	9—11,500	R.	...	...	
Woods ...	8,000	R.	...	...	
Open ...	5,800	R.	...	...	
Do. ...	5,000	R.	...	...	
Do ...	4,500	R.	...	...	
Do. ...	4—8,000	R.	...	...	
Do ...	4,000	R.	...	...	
Near water ...	1, 5—4,000	R.	...	...	
Open ...	12,500	R.	...	...	
On rocks ...	8,500	R.	...	...	
Open ...	5—7,000	R.	...	...	
Do. ...	9,500	R		...	
Do. ...	11,500	..	D.	...	
Do. ...	5—11,000	R.	...	...	
Do. ...	11,000	R.	...	...	
Do. ...	7—9,000	R.	D.	...	
Do. ...	7,000	R.	...	...	
Do. ...	1—7,000	R.	...	...	
Woods ...	3,500	R	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant	Colour of flower.	Time of flowering.	Locality.
2. Celosia						
argentea, *L.*	...	H.	1′—2′	Pk. W.	March	Kálápathar, &c.
3. Amarantus.						
spinosus, *L.*	1	H.	2′	Gr.	August	Kota, Almora,
Anardana, *Ham.*	2	H.	3′—4′	R. Y.	August	Káthi, &c.
caudatus, *L.*	3	H.	3′—4′	R.	August	Almora, &c.
4. Cyathula						
capitata, *Moq.*	1	H.	3′	...	August	Jágesar
tomentosa, *Moq.*	2	Sh.	6′	...	June	Almora, &c.
5. Pupalia.						
lappacea, *Moq.*	...	...	...	...	...	Káládhúngi
6 Ærua.						
scandens, *Wall.*	...	H.	2′—3′	Wh.	March	Outer hills
7. Achyranthes.						
sp ——	1	H.	3′—4′	Wh.	August	Loháthal
argentea, *Lam.*	2	H.	3′	Wh,	August	Háwalbágh
aspera, *L.*	3	H.	4′	Wh.	August	Naini Tál
8 Alternanthera.						
sessilis, *R. Br.*	...	H. er.	1″	...	August	Almora
XCII.—CHENOPODIACEÆ.						
1. Chenopodium.						
multiflorum, *Moq.*	1	H.	2′—3′	...	August	Badarináth
album, *L.*	2, 4, 5	H.	1′—2′	Gr.	August	Tola, Almora,
sp.——	3	H.	...	...	August	Milam
sp.——	6	H.	...	...	...	...
Botrys, *L.*	7	H.	9″	...	...	Almora
2. Blitum.						
virgatum, *L.*	...	H.	9″	...	August	Malári

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Hima-laya.*		Tibet.	Remarks.
		Rainy.	Dry.		
In fields ...	2—5,000	R.	...	...	
Do. ..	2—5,500	R	...	...	
Cultivated ...	4—9,000	R.	...	...	
Do. ...	5—8,000	R.	..	...	
Shady ...	6—9,000	R.	...	...	
Open ...	5—7,500	R.	...	...	
Do. ...	1,000	R.	...	...	
Do. ...	1—5,000	R	...	...	
Shady ...	6,500	R	...	...	
Do. ...	4,000	R.	...	...	
Do. ...	4—7,000	R.	...	..	
Open ...	4,000	R.	...	...	
Do. ...	10,000	...	D.	...	
In fields ...	6—11,500	R.	D.	...	
Do. ...	11,500	...	D.	...	
...	...	R.	...	...	
Cultivated ...	5,000	R.	...	...	
Open ...	10,500	...	D.	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
3. Beta.						
vulgaris, *Moq.* ...	...	...	...	...	...	...
var. orientalis ...	...	H.	...	...	...	Almora ...
4. Atriplex.						
sp.—— ...	1	H.	2″—3″	...	August ...	Topidhunga ...
sp. —— ...	2.	H. cr.	3″	...	August ...	Milam ...
5. Eurotia.						
ceratoides, *C.A. Mey.*,	...	Sh.	1¼′	...	August ..	Laptel, plains of Gugé
6. Salsola.						
Kali? *L.* ...	...	H.	4″	...	August ...	Tisum ...
XCIII.—PHYTOLACCACEÆ.						
1. Phytolacca.						
decandra, *L.* ...	...	H.	1′	Gr.	May ...	Bágesar, &c.,...
XCIV.—POLYGONACEÆ.						
1. Polygonum.						
macrophyllum, *Don*,	1	H.	9″	Cr.	June ..	Dudatoli, Chámi Pass.
Brunonis, *Wall.* ...	2	H.	9″	Cr.	September	,Rálam, Pindari.
vaccinifolium, *Wall.*	3	H.	4″	Cr.	August ...	Do. &c. ...
viviparum, *L.* ...	5	H.	1′—1½	Pk.	August ...	Rálam, Laptel,
var. ...	4	H.	6″	Pk.	August ...	Valleys in Gugé.
var. gracilimum,	6	H.	6″	Pk.	June ...	Rogila ...
horridum, *Roxb.* ...	7	H.	3′—4′	Pk.	July ...	Bhim Tál ...
capitatum, *Don* ...	...	...	...	...	...	...
var. pingue ...	8	H. cr.	4″	Pk.	March ...	Almora, outer hills.
nepalense, *Meisn.* ...	9	H.	2′	Pk.	May ...	Naini Tál, &c.
sphærocephalum, *Wall.*	10	H. cr.	1′—2′	Pk. Pr.	May ...	Káthi ...
perforatum, *Meisn.* ...	11	H.	1′	Pk.	May ...	Naini Tál ...
amplexicaule, *Don* ...	...	...	...	...	May ...	...
var. ambiguum ...	12, 14,	H.	3′	Pk.	...	Do., Káthi, &c.
var. oxyphyllum ...	13	...	...	...	...	...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himálaya.		Tibet	Remarks.
		Rainy.	Dry.		
...	...	...	...	...	
Cultivated ...	500	R.	...	...	
Open ...	15,000	...	...	T.	
Do. ...	13,000	...	D.	..	
Do. ...	15—16,000	...	...	T.	
Do. ...	15,000	...	...	T.	
Cultivated ...	3—7,000	R,	...	...	
Open ...	10—12,000	R.	...	...	
...	11—14,000	R.	D.	...	
...	11,—13,000	R,	D.	...	
Open ...	11—14,5000	R.	D.	T.	
Open rocks ...	14—16,000	...	...	T.	
...	11,000	R.	...	...	
Near and in water.	4,400	R.	...	...	
...	...	...	...	...	
Open ...	5,000	R.	...	...	
Do. ...	6—11,500-	R.	...	...	
Forest ...	7—8,000	R.	...	...	
Do. ...	7,000	R.	...	...	
...	...	...	...	...	
Do. ...	6—8000,	R.	...	...	
...	...	...	...	...	

Name	Herbarium number (Strachey and Winterbottom).	Habit of growth	Height of plant.	Colour of flower	Time of flowering	Locality.
lanigerum, *R. Br.*	...	...	..	.	...	...
var. [illegible]	15	H	2'	Pk	July	Bhim Tál, Almora.
flaccidum, *Roxb.*	16	H.	3'	Wh	May	Lacesar, near Náini Tál
Posumbu, *Ham*	17	H.	2'	R	June	Naini Tál, &c.,
strictum, *All*	18	H.	2'	Pk.	August	Sarju valley
Hamiltonii, *Spreng.*,	19	H.	2'	Wh.	July	Almora
barbatum, *L.*	20	H.	2'	Pk.	February,	Bhábar
aviculare, *L.*	...	..	. .	...	.	..
var. diffusum	21	H. cr.	1'	Pk.	August	Milam
Dryandri, *Spreng.*	22	H. cr.	4"	Pk	May	Naini Tál, &c.
illecebroides, *Meisn.*	23	H. cr.	1"	Pk.	March	Outer hills
quadrifidum, *Ham.*	24	H.	4'	Wh.	June	Naini Tal
glabrum, *Willd.*	25	H.	2'	Pk.	July	Do., Kosi river.
amphibium, *L.*	26	H.	4'	Pk.	June	Do
pterocarpum, *Wall.*	27, 28	H. sc.	4'—5'	Wh.	August. September	Almora, Naini Tal, Dhauli valley.
polystachyum, *Wall.*,	...	. .	...	...	...	.
var. glabrum	32	H	3'—4'	W.	August	Vishnuganga valley
var. pubescens	33	H	3'—4'	Pk.	August	Rálam, Milam.
frondosum, *Meisn.*	34	Sh.	6'	Pk.	May	Láhur, Káthi
rumicifolium, *Royle*,	42	H.	1½'	Gr Y.	August	Rálam
var oblongum	35	H.	2'	?	May	Jhúni
chinense, *L*	...	...	..	. .	...	...
var. Thunbergianum.	36	H.	1'—2'	Pk.	May	Naini Tál
var. corymbosum	36½	H.	1'—2'	Pk.	May	Do.
filicaule, *Wall.*	...	...	.	.	...	...
var. extenuatum	37	H. cr.	4"	Pk.	August	Rálam, Milam.
delicatulum, *Meisn.*	38	H	3"	Pk.	August	Gothing, Kálem.
sp.——	39	H.	½"	R.	August	Barjikáng Pass.
sinuatum, *Royle*	40	H.	4"	Pk.	August	Rálam, &c.
recumbens, *Royle*	41	H cr	6"—9"	Pk,	August	Naini Tál, Pindari Pass.
nummularifolium, *Meisn*	43	H.	6"	Pk	August	Barjikáng Pass.
perforatum, *Meisn.*	...	.	..	. .		...
var. glaciale	44	H.	9"	Pk.	August	Milam
humile, *Meisn.*	45	H.	3'	Wh.	August	Kuthi valley
cognatum, *Meisn.*	...	..	...	...	..	...
var. alpestre	46	H.	1½"	Y, Pk.	August	Compras

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himálaya.		Tibet.	Remarks.
		Rainy.	Dry.		
...	...	...	...	...	
Near water	4,000	R.	...	...	
Do.	3,000	R.	...	...	
Do.	4—6,500	R.	...	...	
Open	4,000	R.	...	.	
Near water	4,000	R.	...	...	
Open	1—2,000	R.	..	...	
...	...	...	..	.	
Do.	11,500	.	D.	.	
Do.	5—7,000	R.	..	..	
Do.	1—7,000	R.		...	
In water	6,[illegible]00	R.	..	...	
Do.	1—6,100	R.	..	...	
Do.	6,400	R.	...	..	
On bushes	5—7,000	R.	...	.	
...	...	.	...	..	
Open	9—10,000	R.	D.	...	
Do.	9—12,000	R.	D.	...	
Near water	7—8,000	R.	...	..	
Open	11,500	R.		..	
Do.	7,500	R.	..	.	
...	..	..	..	...	
Near water	6—7,000	R.	...	..	
Do.	6—7,000	R.	..	...	
...			...	...	
Open	12,000	R.	D.	...	
Do.	11,—13,000	R.	D.	...	
Do.	14,500	R.	D.	...	
Do.	8,5—10,000	R.	...	...	
On rocks	6—[illegible]	R.	...	...	
Open	1[illegible],[illegible]00	R.	...	...	
...	...	...	...	...	
Do.	1[illegible]	..	D.	...	
Do.	[illegible],500	R.	...	...	
...	...	...	..	...	
Do.	14,500	...	D.	T.	

List of Kumoan

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
tortuosum, *Meisn.* ...	...	...	...	...	...	...
var. tibetanum ...	47	H.	½′	Pk.	August ..	Plains of Guge,
sp.—— ...	48	H.	1½′	...	August ..	Do. ...
Olivierii, *Jaub & Spach*	49	P. sc.	¼″	...	August ..	Milam, Niti ...
2. Fagopyrum.						
esculentum, *Mœnch.*	...	H.	2′—3′	Pk.	July ...	Tola, &c. ...
cymosum, *Meisn.* ...	...	H.	3′	Pk.	August ...	Chaur, Almora,
rotundatum, *Bab.* ...	...	H.	2′—3′	Pk.	July ...	Tola, &c., ...
XCV.—ARISTOLOCHIACEÆ.						
1. Aristolochia.						
saccata, *Wall.* ...	...	S. sc.	3′—10′	Pr. B.	May ...	Nainí Tál, Mádhári Pass.
XCVI.—PIPERACEÆ.						
1. Peperomia.						
reflexa, *L.* ...	1	H.	2″	..	February,	Sarju river, Binsar.
Heyneana, *Miq.* ...	2	...	...	...	...	...
2. Piper.						
longum, *L.* ...	...	H.	...	...	...	The Bhábar ...
XCVII.—LAURINEÆ.						
1. Cinnamomum.						
Tamala, *Nees.* ...	...	S.	10′—12′	Wh.	May ...	Bágesar valley,
2. Machilus.						
odoratissimus, *Nees.*	1	Tr.	20′—50′	Gr. Y.	March ...	Outer hills, &c.,
var. ..	2	Tr.	40′	Gr. Y.	March ...	Do. Sarju river.
3. Phœbe.						
lanceolata, *Nees.* ..	1	Tr.	10′—30′	...	May ...	Baisání ...
pallida, *Nees.* ..	2	Tr.	20′—30′	Wh.	May ...	Ják Pass ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
...	...	...	...	...	
Open ...	15,500	...	...	T.	
Do. ..	15,000	...	...	T.	
...	...	...	...	...	
Cultivated ...	5—11,500	R.	D.	...	= *Polygonum* No. 29 in Herb. S. and W.
Open ...	5—7,000	R.	...	...	= *Polygonum* No. 30 in Herb. S. and W.
Cultivated ..	7—11,500	R.	D.	...	= *Polygonum* No. 31 in Herb. S. and W.
Forest ...	6,5—8,000	R.	...	...	
Trees & rocks.	3—6,000	R.	...	...	
...	...	...	...	...	
Forest ...	1—2,400	R.	...	...	
Do. ...	3—4,500	R.	...	...	= *C. albiflorum* in Herb. S. and W.
Do. ...	1—4,500	R.	...	...	
Do. ...	4—6,500	R.	...	...	
Do. ...	4,500	R.	...	...	
Do. ...	5,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant	Colour of flower	Time of flowering	Locality.
4. Litsea.						
consimilis, *Nees*	...	Sh.	15′—20′	Wh	March	Naini Tál
lanuginosa, *Nees*.	..	...	...	...	...	?
5. Tetranthera.						
tomentosa, *Roxb.*	1	...	...	...	...	Kosi river
monopetala, *Roxb.*	2	...	..	...	March	Outer hills, Srinagar.
6 Daphnidium.						
pulcherrimum, *Nees*,	1	...	...	...	April	Naini Tál, Binsar.
bifarium, *Nees*	2	Tr.	25′—30′	.	May	Satráli valley,
sp.——	3	..	...	..	May	Binsar
XCVIII.—THYMELACEÆ.						
1. Daphne.						
papyracea, *Wall.*	1	Sh.	3′—4′	Wh.	June	Naini Tál, Binsar, &c
oleoides, *L.*	2	Sh.	4′—5′	W. Y.	June	Jelam
2 Wikstræmia.						
virgata, *Meisn.*	..	Sh.	6′	Wh.	June	Naini Tál, &c.
3 Stellera.						
concinna, *Edgew.*	...	H.	1″—1½′	Pk.	June	Bampa
XCIX.—ELÆAGNACEÆ.						
1. Hippophæ.						
rhamnoides, *L.*	1	Sh.	1′	...	...	Milam, plains of Gáge
salicifolia, *Don.*	2	T.	15′—20′	..	...	Dwáli, Gori river.
2. Elæagnus.						
umbellata, *Thunb.*	1, 2	S. T,	8′—20′	...	April	Almora, Naini Tál.
latifolia, *L.*	3	T.	...	...	...	Kota Dún

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea	Himalaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Forest	6—7,000	R.	..	..	= *Tetradenia* in Herb. S. and W.
..	...	R.	..	...	= *Daphnidium* No 4 in Herb. S. & W.
Do.	3,500	R.	..	...	
Do	1,5—5,000	R.	..	...	
Do	7,000	R.	..	..	
Do	5,000	R		..	
Do.	8,000	R.	..	.	
Woods	6—9,000	R.	...	..	
Open	8,500	...	D.	...	
Woods	6—10,000	R.	D.	...	
Open	11,000	...	D.	...	= *Passerina* in Herb. S. & W.
Do.	12—15,000	...	D.	T.	
Forest by water	6,5—9,000	R.	. .	...	
Open	5—7,000	R.	...	...	
Forest	2,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
C.- LORANTHACEÆ.						
1. Loranthus.						
longiflorus, *Desr.*	1	Sh. p.	3′—4′	Sc.	March	Bhábar
cordifolius, *Wall.*	2, 3	Sh. p.	4′—5′	Br. R.	March	Outer hills
pulverulentus, *Wall.*	4	Sh. p.	3′—4′	Y. Gr.	March	Bhábar, Bágesar.
vestitus, *Wall.*	5	Sh. p.	2′—3′	R.	May	Gángoli, Naini-Tál
ligustrinus, *Wall.*	6	Sh. p	2′—3′	Sc.	May	Bágesar
sp.——	7	Sh. ?	...	...	...	Baisáni
2 Viscum.						
attenuatum, *DC.*	1	Sh. p	1′—2′	...	June	Bhábar, Gangoli.
album, *L.*	2	Sh. p	1′—2′	...	May	Common
articulatum, *Burm.*	3	Sh. p	4″—6″	...	May	Gágar &c
sp.——	4	Sh. p	1″	...	...	?
CI.—SANTALACEÆ						
1. Thesium.						
multicaule, *Ledeb.*	...	H.	6″	Wh.	July	Binsar, Níti
2. Osyris.						
arborea, *Wall.*	...	Sh.	5′—8′	...	March	Kalimat, &c.
CII.—EUPHORBIACEÆ..						
1. Euphorbia.						
pilulifera, *L.*	1	H.	3″—12″	Wh.	Do.	Kaládhúngi
indica, *Lam.*	2	H.	1′—1½′	Pk.	August	Sarju river
Stracheyi, *Boiss*	5, 18	H.	3″	...	Do.	Barjikáng Pass
sp.——	6	H.	6″	...	Do.	Karnáli river, Laptel.
sp. (E. procera, *Bieb?*)	7	H.	1′—1½′	...	?	?
sp.——	8	H.	1′—1½′	...	June	Singjari
cognata, *Boiss.*	9, 10	H.	1′—1½′	...	March	Kálimat, Námik
nepalensis, *Boiss*	11, 13 14	H.	1′	...	Do.	Almora
Maddeni, *Boiss.*	15	H.	4′	...	Do.	Naini Tál
sp.——	16	H.	3″—4″	...	June	Ramni

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
On ulmus ...	1—2,500	R.	...	...	
On dalbergia ...	4—5,000	R.	...	...	
On trees ...	1—3,000	R.	...	...	
On quercus ...	6—7,000	R.	...	...	
On trees ...	3,000	R.	...	...	
?	4,000	R.	...	...	
On trees ...	1—5,500	R.	...	...	
On pyrus and ulmus.	3—7,500	R.	...	...	
On quercus ..	6—7,000	R.	...	...	
?	?	R.	...	...	
[illegible] ...	6—11,500	...	D.	...	
Do. ...	4—6,000	R.	...	...	
Do. ...	1,000	R.	...	...	
Do. ...	4—5,000	R.	...	...	
Do. ...	13,000	R.	...	...	
Do. ...	15—16,000	...	...	T.	
Do. ...	...	...	...	...	
Do. ...	9—10,000	R.	...	...	
Do. ...	6—8,000	R.	...	...	
Do. ...	5—6,000	...	...	...	
Do. ...	7,500	R.	...	...	
Do. ...	9,000	...	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
sp. —— ...	17	H.	4"—6"	...	July ..	Rimkim ...
sp.—— ...	19	H.	1"	...	July ...	Raj-hoti, Bomprás.
sp. —— ...	20	H.	1"	...	May ...	Champwa ...
Royleana, *Boiss.* ...	*	Sh.	10'	...	March ...	Sarju river &c.,
2. Sarcococca.						
saligna. *Müll.* ...	...	Sh.	4'	...	April ...	Naini Tál ...
3. Buxus.						
sempervirens, *L.* ...	...	Tr.	20'	...	July ...	Rámni, Bagdwár.
4. Bridelia.						
stipularis, *Bl.* ...	1	Sh.	..	...	...	Bhábar ...
retusa, *Spreng.* ...	2	Tr.	25'	...	...	Sarju river ...
5. Andrachne.						
cordifolia, *Müll.* ...	...	Sh.	6'—8'	...	February,	Rámganga river.
6. Phyllanthus.						
Urinaria, *L.* ...	1	H.	3"—6'	...	July ...	Almora ...
Niruri, *L.* ...	2	H.	1'	...	September,	Bágesar ...
reticulatus, *Poir.* ...	...	Sh.	10'	W. Gr.	August ...	Moha-gári ..
Emblica, *L.* ...	...	Tr.	15'	...	March ...	Outer hills, Sarju river.
nepalensis, *Müll.* ...	...	Tr.	...	...	July ...	Bhábar, Sarju river.
sp.—— ...	5	Sh.	3'—4'	...	July ...	Almora ...
sp.—— ...	...	Tr.	15'	...	...	Kota ...
sp.—— ...	...	Sh.	15'—20'	Y.	May ..	Bágesar ...
7.—Securinega.						
obovata, *Müll.* ...	...	Sh.	3'—12'	W. Gr.	May ...	Bhim Tál, Kosi valley.
8. Putranjiva.						
Roxburghii, *Wall.* ...	...	Tr.	...	...	...	Bhábar ...
9. Daphniphyllum.						
himalense ...	...	Tr.	30'	...	...	Gágar ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open	14,000	...	..	T.	
Do.	15,000	..	D.	T.	
Do.	12,000	R	..	..	
Do.	2—4,000	R.	.	...	
Forest	7,000	R.	...	...	
Do.	8—9,000	R	...	...	
Do.	1 000	R.	...	...	
Do.	3,000	R.	...	...	
Open	8,500	L.	...	...	= *Leptopus cordifolius* in Herb. S and W.
Wet	5,000	R.	...	...	
Open	3,000	R.	...	...	
Do.	4,500	R.	...	...	= *Fluggea* No 1 in Herb. S. and W
Do.	1—4,500	R.	...	...	= *Emblica officinalis* in Herb. S. and W.
Forest	1—4,000	R.	...	...	= *Bradleia ovata* in Herb. S. and W.
Open	5,000	R.	...	...	= *Ph. juniperinus*, Wall. in Herb. S. and W.
Forest	2,000	R.	...	...	= *Anisonema* in Herb. S. and W.
Do.	4,000	R.	...	...	= *Glochidion bifarium*? in Herb. S. and W.
Open	4—5,000	R.	...	...	= *Fluggea* Nos. 2 and 3 in Herb. S. and W.
Forest	1,000	R.	...	...	
Do.	6—7,000	R.	...	...	= *Goughia* in Herb. S. and W.

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
10. Antidesma.						
diandrum, *Tulasne*	...	T.	...	...	...	Kota Dún ...
11. Jatropha.						
Curcas, *L.*	...	...	...	...	...	Bhábar ...
12. Acalypha.						
calyciformis, *Wight,*	...	H.	1′	...	September,	Dhánpur ...
13. Adelia.						
sp.——	...	Tr.	30′	...	February,	Outer hills, Sarju valley.
14. Trewia.						
nudiflora, *L.*	...	Tr.	20′—30′	Gr. Y.	March ...	Bhábar ...
15. Mallotus.						
philippinensis, *Müll.,*	...	Tr.	25′	...	December,	Sarju river ...
16. Ricinus.						
communis, *L.*	...	Sh.	8′—12′	R.	...	...
17. Excæcaria.						
acerifolia, *Müll.*	...	Sh.	4′—5′	...	All the year.	Kapkot, Gangoli.
insignis, *Müll.*	...	Tr.	20′—30	Y.	January ..	Outer hills, Sarju river.
CIII.—URTICACEÆ.						
1. Ulmus.	1	Tr.	40′—60′		March ...	Bhábar ...
integrifolia, *Roxb.*	1½	Tr.	30′—40′	...	February,	Bágesar ...
parvifolia, *Jacq.*	...	Tr.	...	...	...	...
campestris, *L*	2	Tr.	30′—40′	...	March ...	Naini Tál ...
var. macrophylla	3	Tr.	501	...	April ...	Dwáli ...
" ——				...		
2 Celtis.						
australis, *L.*	2, 3	Tr.	25′—40′	..	March ...	Kota, Námik, Almora.
criocarpa, *Dcne.*	4, 5	Tr.	20′	...	March ...	Kota, Almora, &c.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
...	2,500	R.	...	...	
Forest ...	2,000	R.	...	...	
Open ...	8,000	R.	...	...	
Forest ...	2—3.000	R.	...	...	
Do. ...	1—2,000	R.	..	...	
Do. ...	1—4,000	R.	...	...	= *Rottlera* in Herb. S. and W.
Cultivated ...	2,000	R.	...	...	
Open ...	3,5—5000	R.	...	...	= *Sapium sp.* in Herb. S. and W.
Do. ...	2—5,000	R.	...	...	= *Falconeria* in Herb. S. and W.
Forest ...	1,000	R.	...	...	
...	3,500	R.	...	...	
...	...	...	...	...	
...	7,000	R.	...	...	
...	8,500	R.	...	...	
Forest ...	2—6,500	R.	...	...	
Do. ...	2—5,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Habit of plant.	Colour of flower.	Time of flowering.	Locality.
3. **Sponia.**						
pólitoria, *Planch.* ...	...	Sh.	10′	...	December,	Kálapathar ...
4. **Cannabis.**						
sativa, *L.* ..	...	H.	8′—18′	...	September,	Almora, &c. ...
5. **Streblus.**						
asper, *Lour.* ...	...	Tr.	25′	Wh.	March ..	Bhábar ...
6. **Morus.**						
lævigata, *Wall.* ..	1	Tr.	30′	...	February,	Kota ...
indica, *L.* ...	2, 4	Tr.	20′	...	February,	Do. ...
serrata, *Roxb.* ...	3	Tr.	44′	...	May ...	Námik ...
7. **Ficus.**						
cordifolia, *Roxb.* ...	1	Tr.	15′	...	...	Kota .
religiosa, *L.* ...	2	Tr.	60′	...	...	Do., &c. ...
virgata, *Roxb.* ...	3	Tr.	15′	...	...	Bhábar, Almora.
sp.—— ...	4	Tr.	20′—30′	...	...	Kota ...
retusa, *L.* ...	5	Tr.	30′	...	...	Kosi river ...
Roxburghii, *Wall.* ...	6	Tr.	15′	...	...	Rámganga river
infectoria, *Roxb.* ...	7	Tr.	40′	...	...	Píndar river ...
conglomerata, *Roxb.*...	8	Tr.	15′	...	...	Rámganga river.
tuberculata, *Wall.* ...	9	S. sc	15′	...	...	Sarju ...
hispida, *L. f.* ...	10	Tr.	20′	...	...	Bhábar ...
indica, *L* ...	11	Tr.	60′	...	...	Kota Dún, &c.,
pubigera, *Wall.* ...	12	S. sc.	30′—40′	...	...	Below Gangoli Bágesar.
scandens, *Roxb.* ...	13	S. sc.	50′	...	...	Bágesar ...
foveolata, *Wall.* ...	14	S. sc.	30′	...	...	Naini Tál, Dhauli river.
parasitica, *Kan.* ...	15	S. sc.	30′	...	...	Káládhúngi ...
sp.—— ..	16	?	...	...	...	?
sp —— ...	18	Tr.	...	...	...	Outer hills ...
sp.—— ...	19	Tr.	30′	...	...	Pyura ...
sp.—— ...	20	Fr.	40′	...	...	Bhábar ...

Plants—(continued).

Conditions of soils, &c.	Elevation in feet above the sea.	*Himálaya* Rainy.	*Himálaya* Dry.	Tibet.	Remarks.
Open ...	2,000	R.	...	...	
Do. ...	2—5,000	R.	...	...	
Forest ...	1,000	R.	...	...	= *Epicarpus* in Herb. S. and W.
Do. ...	2,000	R.	...	...	
Open ...	500—2,000	R.	...	...	
Forest ...	5—9,000	R.	...	...	
Do. ...	1—5,400	R.	...	...	
Do. ...	1,500	R.	...	...	
Open ...	1—4,000	R.	...	...	
Do. ...	3—5,000	R.	...	...	= *F. brachycarpa, Miq.*, in Herb. S and W.
Do. ...	3,000	R.	...	...	
Do. ...	2—5,000	R.	...	...	
Do. ...	500—4,000	R.	...	...	
Do. ...	500—4,000	R.	...	...	
On rocks ...	2,500	R.	...	...	
Forest ...	1—2,000	R.	...	...	
Open ...	1,000	R.	...	...	
Do. and Forest.	2,500—3,000	R.	...	.	
Forest ...	3,000	R.	...	...	
On rocks ...	6—7,000	R.	...	...	
Open ...	1,000	R.	...	...	
...	...	R.	...	...	
Forest ...	4,000	R.	...	...	
Open ...	6,000	R.	...	...	= *F. densa, Miq.*, in Herb. S. & W.
Forest ...	1,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
8. Artocarpus.						
Lakoocha, *Roxb.* ...	Tr.	...	30′—40′	...	...	Near Kota ...
9. Urtica.						
parviflora, *Roxb.* ...	1, 3, 16	H.	3′—8′	...	February, July.	Páton, Kota ...
dioica, *L.* ...	2, 15	H.	4′	...	...	?
hyperborea, *Jacquem.*,	4, 18	H.	1′—2′	...	August ...	Kyungar ...
10. Laportea.						
evitata, *Wall.* ...	...	H.	3′	...	July ...	Jalat ...
11. Girardinia.						
heterophylla, *Dcne.* ...	...	H.	10′	...	August ...	Páton ...
12. Pilea.						
umbrosa, *Wedd.* ...	1	H.	1′—2′	...	July ...	Binsar ...
scripta, *Wedd.* ...	2	H.	3′	...	...	Do Gágar ...
trinervia, *Wight* ...	3	H.	1½′	Wh.	August ...	Kálimundi ...
13. Lecanthus.						
Wightii, *Wedd.* ...	...	H.	2″—3″	Pk.	August ...	Rámganga river, Jagesar.
14. Elatostemma.						
obtusum, *Wall.* ...	1	H.	6″	...	June ...	Káthi, Láhur...
sessile, *Wedd.* ...	...	...	...	...	...	...
var. polycephalum,	2	H.	1′	...	August ...	Naini Tál, Námik.
" cuspidatum ...	3	H.	1′—2′	...	May ...	Lahur ...
diversifolium, *Wall.*...	4	H.	6″	...	August ...	Lohathal ...
Stracheyanum, *Wedd.*,	5	H.	8″	...	June ...	Tola, Binsar ...
sp.—— ...	6	H.	4′—6′	...	February,	Sarju river ...
15. Bœhmeria.						
platyphylla, *Wedd.* ...	1, 2, 3, 6	H. or S.	1′—10′	...	May to August.	Dhakuri-bináyak, Bágesar, Sarju river, Almora.
macrophylla, *Don* ...	4	S.	6′—10′	...	August ...	Sarju river ...
rugulosa, *Wall.* ...	7	Tr.	20′	Wh.	...	Ditto ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.* Rainy.	*Himálaya.* Dry.	Tibet.	Remarks.
Forest ...	3,000	R.	...	...	
Open ...	2,5—10,000	R.	...	...	
Do ...	...	R.	...	...	
Do. ...	14—17,500	...	D.	T.	
Woods ...	7,000	R.	...	...	= *Urtica* No. 2 in Herb. S. and W.
Open ...	4—9,000	R.	...	...	= *Urtica* No. 9 in Herb. S. and W.
Woods ...	5—8,000	R.	...	...	= *Urtica* No. 1 in Herb. S. and W
Do by water,	5—7,500	R.	...	...	= *Urtica* No. 19 in Herb. S. & W
Woods ...	8,700	R.	...	...	= *Urtica* No. 17 in Herb. S. and W
Damp shade ...	4—9,000	R.	...	...	= *Procris* Nos. 3, 4, 8, & 9 in Herb. S. and W.
Wet banks ...	7,000	R.	...	...	= *Procris* No. 1 in Herb. S. & W.
...	...	...	...	...	
Do. ...	7—8,000	...	...	...	= *Procris* No. 7 in Herb. S. & W.
...	...	...	...	...	= *Procris* No. 6 in Herb. S. and W.
Ditto ...	6—7,500	R.	...	...	= *Procris* No. 2 in Herb. S. & W.
Ditto ...	5—6,500	R.	...	...	= *Procris* No. 5 in Herb. S. & W.
Wet shady rocks.	4,000	R.	...	...	= *Urtica* No. 23 in Herb. S. & W.
Forest & open,	2—7,500	R.	..	...	= *Urtica* Nos. 4, 5 and 20 in Herb. S. and W.
Open ...	2—4,000	R.	...	...	= *Urtica* No. 7 in Herb. S. & W.
Ditto ..	3—5,000	...	...	...	= *Urtica* No. 21 in Herb. S. & W.

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
16. Chamabaina.						
cuspidata, *Wedd.*	...	H.	9″	Pk.	August	Mohargári, Tungnáth.
17. Memorialis.						
ciliaris, *Wedd.*	...	H.	1½′	...	...	Baijnáth
18. Pouzolzia.						
ovalis, *Wedd.*	1	...	...	...	...	?
quinquenervis, *Bl.*	2	H.	4′	...	August	Almora
19. Villebrunia.						
frutescens, *Bl.*	...	Sh.	10′—15′	...	...	Bágesar
20. Debregeasia.						
velutina, *Wedd.*	1	Sh.	5′—15′	...	August	Gori river, Sarju river.
hypoleuca, *Wedd.*	2	Sh.	15′	...	March	Rámganga river.
21. Maoutia.						
Puya, *Wedd.*	...	Sh.	5′	...	August	Sarju valley
22. Parietaria.						
debilis, *Forsk.*	...	H.	1′	...	September,	Below Milam & Badarináth.
CIV.—JUGLANDACEÆ.						
1. Juglans.						
regia, *L.*	...	Tr.	40′—50′	...	March	Dwáli
2. Engelhardtia.						
Colebrookiana, *Lindl.*,	1	Tr.	30′—40′	...	March	Kota, Bágesar.
sp.——	2	Tr.	...	...	...	?
CV.—MYRICACEÆ.						
1. Myrica.						
sapida, *Wall.*	...	Tr.	20′—30′	...	April	Suring, Almora.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himá-laya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Wet banks ...	6—10,000	R.	...	...	= *Urtica* No. 8 in Herb. S. & W.
Open ...	3,500	R.	...	...	
...	?	...	...	...	= *Urtica* No. 24 in Herb. S. & W.
Open banks ...	5,000	R.	...	...	= *Urtica* No. 10 in Herb. S. & W.
Forest ...	3—5,000	R.	...	...	= *Urtica* No. 22 in Herb. S. & W.
Open ...	2, 5—5,000	R.	...	...	= *Urtica* Nos. 12 and 13 in Herb. S. and W.
Ditto ...	3—5,000	R.	...	...	= *Urtica* No. 14 in Herb. S. & W.
Banks ...	2—4,000	R.	...	...	= *Urtica* No. 11 in Herb. S. & W.
Open ...	8,500—13,000	R.	D.	...	
Forest ...	4—8,500	R.	...	...	
Do. ...	2—5,000	R.	...	...	
?	?	R.	...	...	
Open ...	5—6,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
CVI.—CUPULIFERÆ.						
1. Carpinus.						
viminea, *Wall.* ...	1	Tr.	50′	...	March ...	Naini Tál, Binsar.
faginea, *Lindl.* ...	2	Tr.	50′	...	March ...	Naini Tál, Binsar.
2. Corylus.						
Colurna, *L* ...	...	Tr.	50′	...	May ...	Dwáli Tonghári.
3. Quercus.						
semicarpifolia, *Sm.* ...	1	Tr.	100′	...	April ...	China, Káthi, &c.
lanuginosa, *Don* ...	2	Tr.	40′	...	April ...	Naini Tál, Binsar.
dilatata, *Lindl.* ...	3	Tr.	60′	...	April ...	Naini Tál, Binsar.
incana, *Roxb.* ...	4	Tr.	60′	...	March ...	Ubique ...
annulata, *Sm.* ...	5	Tr.	50′	...	March ...	Bágesar valley,
4. Castanea.						
tribuloides, *A.DC.* ...	...	Tr.	40′	...	August ...	Gangoli, &c. ...
5. Betula.						
Bhojpattra, *Wall.* ...	1, 2	Tr.	15′—30′	...	May ...	Champwa, &c.,
acuminata, *Wall.* ...	3, 4	Tr.	40′—60′	...	April ...	Binsar, Naini Tál.
6. Alnus.						
nepalensis, *Don* ...	...	Tr.	30′—40′	...	October ...	Binsar, Naini Tál.
CVII.—SALICINEÆ.						
1. Salix.						
acutifolia, *Willd.* ...	1	Sh.	12′	...	...	Rámni, Betuli Pass
elegans, *Wall.* ...	2, 6, 7	Sh.	6′—15′	...	May, June,	Naini Tál, Dugli, Nánik, [illegible]ti.
tetrasperma, *Roxb.* ...	4	Tr.	25′	...	May ...	Satráli valley,
Wallichiana, *Anders.*,	3, 11	Sh.	12′	...	April ...	Gágar ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himá-laya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Forest ...	7—8,000	R.	...	...	
Do. ...	7,000	R.	...	...	
Do. ...	7—9,000	R.	...	...	
Do. ...	7—11,500	R.	...	...	
Do ...	7—8,000	R.	...	...	
Do. ...	6, 5—9,000	R.	...	...	
Do. ...	4, 5—7,500	R.	...	...	
Do. ...	3—5,000	R.	...	...	
Do. ...	4—6,000	R.	...	...	
Do. ...	11—12,000	R.	D.	T.	
Do. ...	6—8,000	R.	...	...	
Do. ...	4—9,000	R.	...	...	
Do. ...	8—10,000	R.	...	...	
Do. ...	7—11,500	R.	D.	...	
Open ...	1—4,500	R.	...	...	
Forest ...	5—6,500	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
Grisea, *Wall.* ...	5	Sh.	15′	...	April ...	Gágar, Sarju valley.
sclerophylla, *Anders.*,	8, 10	Sh.	3′—10′	...	July ...	Rimkim, Rajhoti.
Lindleyana, *Wall.* ...	12, 14	Sh.	2″—2′	...	June, July,	Pindari, Barjikáng Pass.
furcata, *Anders.* ...	13	Sh.	9″—12″	...	May ...	Pindari, Barjikáng Pass.
CVIII.—GNETACEÆ.						
1. Ephedra.						
vulgaris, *Rich.* ...	...	S.	1′—2′	...	June ...	Pindari, ... Milam, Tibet.
CIX.—CONIFERÆ.						
1. Cupressus.						
torulosa, *Don* ...	...	T.	100′	...	February,	Naini Tál ...
2. Juniperus.						
excelsa, *M. Bieb.* ...	1	T.	20′—30′	...	June ...	Milam, Malári,
recurva, *Don* ...	2	Sh.	4′	...	June ...	Dugli, &c. ...
var. squamata, Wallichiana, *Hf. & T.*	3	Sh.	5′	...	May ...	Pindari, Milam.
communis, *L.* ...	4	Sh.	4′	...	May ...	Milam, Rimkim.
3. Taxus.						
baccata, *L.* ...	...	T.	50′	...	April ...	Dwáli, &c. ...
4. Pinus.						
longifolia, *Roxb.* ...	1	T.	100′	...	February,	Ubique ...
excelsa, *Wall.* ...	2	T.	100′	...	May ...	Above Joshimath.
5. Cedrus.						
Deodara, *Loud.* ...	...	T.	150′	...	September,	Jelam ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himalaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	5—6,500	R.	...	...	
Do. ...	13,500 —15,500	...	D.	T.	
Do. ...	11—14,000	R.	...	...	
Do. ...	12,000	R.	...	...	
Open ...	9—16,000	R.	D.	T.	
Forest ...	4,5—9,000	R	...	...	
Open ...	9—14,000	...	D.	T.	
Do. ...	10,500	R.	...	T.	
Do. ...	9—14,000	R.	D,	...	
Do. ...	9—14,500	...	D.	T.	
Forest ...	7—11,000	R.	D.	...	
Open forest ...	2—7,500	R.	...	...	
Do. ...	5—11,500	R.	D.	...	
Forest ...	9—11,500	R.	D.	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
6. Abies.						
Webbiana, *Wall.* ...	2	T.	150′	...	May ...	Champwa, Dwáli.
var. Pindrow ...	1	T.	150′	...	May ...	Káthi, &c. ...
Smithiana, *Wall.* ...	3	T.	150′	...	April, ...	Above Joshimath.
CX.—HYDROCHARIDEÆ.						
1. Hydrilla.						
verticillata, *Rich.* ...	...	H.	...	...	...	Bhim Tál, Naini Tál.
2. Vallisneria.						
spiralis, *L.* ...	...	H.	...	...	...	Bhim Tál, Naini Tál.
CXI.—SCITAMINEÆ.						
1. Globba.						
orixensis, *Roxb.* ...	...	H.	3′	Or.	...	Dyári Pass, Háwalbágh.
2. Zingiber.						
capitatum, *Roxb.* ...	1	H.	4′	Y.	August ...	Sarju valley ...
chrysanthum, *Rosc.* ...	2	H.	4′	Y.	August ...	Mohargári ...
3 Curcuma.						
longa, *Wall.* ...	...	H.	1′—2′	Or.	August ...	Bágesar ...
4. Roscoea.						
purpurea, *Sm.* ...	1	H.	1′—1½′	Pr.	May ...	Naini Tál ...
alpina, *Royle* ...	2	H.	4″—6″	Pr.	June ...	Karim Pass, China.
gracilis, *Sm.* ...	3	H.	1′—1½′	...	June ...	Naini Tál ...
elatior, *Sm.* ...	4	H.	2′	Y.	August ...	Kálimundi ...
5. Hedychium.						
coccineum, *Sm.* ...	1	H.	5′	S. O.	August ...	Jágesar ...
spicatum, *Sm.* ...	...	...	...	...	...	...
var. elatum ...	2	H.	5′	W. Pk.	August ...	Naini Tál ...
densiflorum, *Wall.* ...	3	H.	4′	W. Pk.	July ...	Near Bágesar...
ellipticum, *Sm.* ...	4	H.	3′	Y.	August ...	Do. ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.* Rainy.	*Himálaya.* Dry.	Tibet.	Remarks.
Thick forest	9,5—11,000	R.	...	...	
Do.	7,5—10,000	R.	D.	...	
Forest	6—11,000	...	D.	...	
In water	4 6,400	R.	...	...	
Do.	4,400	R.	...	...	
Woods	4—7,000	R.	...	...	
Open	2,500	R.	...	...	
Banks	3—4,500	R.	...	...	
Open	3—6,000	R.	...	...	
Woods.	6—7,500	R.	...	...	
Open	7—11,000	R.	...	...	
On trees	6—7,000	R.	...	...	
Woods	8,500	R.	...	...	
Open	4—5,000	R.	...	...	
...	...	...	...	...	
Woods	5—8,000	R.	...	...	
Banks	5,000	R.	...	...	
Open	3—4,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
6. Costus.						
speciosus, *Sm.* ...	...	H.	3'	Pr.	August ...	Sarju valley ...
7. Musa.						
sapientum, *L.* ...	...	H.	6'—8'	...	?	Sarju and Káli river.
CXII.—ORCHIDEÆ.						
Epiphytal.						
1. Oberonia.						
iridifolia, *Lindl.* ...	2	H.	4"—6"	...	...	Bhábar, Bágesar,
2. Empusa.						
paradoxa, *Lindl.* ...	3	H.	9"	G. Y.	August ...	Lohathal ...
3. Dienia.						
cylindrostachya, *Lindl.*,	4	H.	1'	G. W.	August ...	Jágesar ...
4 Liparis.						
nepalensis, *Lindl.* ...	1	H.	8"	...	July ...	Binsar ...
5. Phalidota.						
articulata, *Lindl.* ...	17	H.	4"	Pk.	July ...	Bágesar, outer hills.
imbricata, *Lindl.* ...	16	H.	1'—1½'	Wh.	August ...	Rámganga river, Sarju.
6. Cœlogyne.						
elata, *Lindl.* ...	14	H.	1'—½'	...	May ...	Sarju river ...
cristata, *Lindl.* ...	15	H.	1'	Wh.	April ...	Champáwat, &c.
7. Bolbophyllum.						
umbellatum, *Lindl.* ...	10	H.	4"	...	...	Rámganga river
8. Cirrhopetalum.						
Wallichii, *Lindl.* ...	11	H.	3"	...	...	Bágesar valley,

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.* Rainy.	*Himalaya.* Dry.	Tibet.	Remarks.
Open ...	2,500	R.	...	...	
Woods ...	3—4,000	R.	...	...	
On trees ..	1—3,500	R	...	...	
Open ...	6,000	R.	...	...	
Do. ...	7,000	R.	...	...	
On trees ...	7,500	R.	...	...	
Do. ...	3—3,500	R.	...	...	
Do. ...	3,500	R.	...	...	
Do. ...	3,700	R.	...	...	
Do. ...	5,500	R.	...	...	
Do. ...	3,500	R.	...	...	
Do. ...	3,700	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
9. Eria.						
excavata, *Lindl.* ...	12	H.	6"	Wh.	August ...	Jágesar ...
sp.—— ...	13	H.	6"	Gr. Y.	August ...	Mohargári ...
10. Dendrobium.						
denudana, *Don* ...	5	H.	3"	...	September,	Jalath ...
sp.—— ...	6	H.	1'	Or.	May ...	Jagthána, &c.,
sp.—— ...	7	H.	...	...	...	...
sp.—— ...	8	H.	6"—8"	...	...	Rámganga river
sp.—— ...	9	H.	2'	...	...	...
11 Phajus.						
albus, *Lindl.* ...	18	H.	½'	Wh.	August ..	Bágesar valley,
12. Cymbidium.						
giganteum, *Swartz.* ...	20	H.	1½'	Br. R.	October ...	Bágesar valley,
13. Vanda.						
cristata, *Lindl.* ...	21	H.	9"—12"	...	May ...	Bágesar, outer hills.
sp.—— ..	22	H.	...	...	May ...	Bágesar ...
14. Chiloschista.						
sp.—— ...	23	H.	6"	Pk.	May ..	Below Binsar.
15. Saccolabium.						
guttatum, *Lindl.* ...	24	H.	1'	Pk.	July ...	Bágesar, outer hills
16. Aerides.						
affine, *Wall.* ...	25	H.	1'	Pk.	July ...	Bhábar, Bágesar.
TERRESTRIAL.						
17. Eulophia.						
rupestris, *Lindl.* ...	19	H.	9"	Pk.	May ..	Bágesar ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the area.	*Himá-laya.*		Tibet.	Remarks.
		Rainy.	Dry.		
On trees	6,000	R.	...	...	
Do.	4,000	R.	...	...	
On rocks	4,700	R.	...	...	
On trees	4,000	R.	...	...	
Do.	4,000 ?	R.	...	...	
Do.	3,500 ?	R.	...	...	
Do.	4,000 ?	R.	...	...	
Do.	3,000	R.	...	...	
Do.	4,000	R.	...	...	
Do.	3,500	R.	...	...	
Do.	3,000	R.	...	...	
Do.	3,500	R.	...	...	
Do.	3,000	R.	...	...	
Do.	1—3,000	R.	...	...	
Open	3,500	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
18. Cyrtoptera.						
flava, *Lindl.* ...	20	H.	2′	Y.	July ...	Below Almora,
19. Calanthe.						
plantaginea, *Lindl.* ...	27	H.	1′	Pk.	May ...	Binsar, &c. ...
20. Orchis.						
latifolia, *L.*, var. ...	28	H.	1′	Pk.	June ...	Kulára, Tola.
21. Gymnadenia.						
Chusua, *Lindl.* ...	35	H.	4″	Pk.	June ..	Rogila ..
orchidis, *Lindl.* ...	42	H.	1′—2′	?	August ..	Naini Tál ...
22. Aceras.						
angustifolia, *Lindl.* ...	29	H.	4″—6″	Gr.	August ...	Naini Tál ...
23. Platanthera.						
Susannæ, *Lindl.* ...	39	H.	2′	Wh.	August ...	Almora.
obcordata, *Lindl.* ...	40	H.	6″	Pk.	August ...	Kálimat, Jágesar.
acuminata, *Lindl.* ...	41	H.	6″	Wh.	July ...	Almora, Naini Tál.
candida, *Lindl.* ...	44	H.	9″	Wh.	August ...	Bágesar, Lohathal
24. Hemipilia.						
cordifolia, *Lindl.* ...	37	H.	5″	Pk.	August ..	Shaidevi Peak,
25. Peristylus.						
fallax, *Lindl.* ...	32	H.	1′	Gr. Y.	August ...	Naini Tál, Bálam.
goodyeroides, *Lindl.*,	33	H.	1′—1½′	Gr.	July ...	Almora ...
26. Herminium.						
gramineum, *Lindl.* ...	31	H.	4″	Gr.	August ...	Kálimundi ? ...
congestum, *Lindl.* ...	34	H.	6″	Gr.	August ...	Tola ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the area.	Himálaya. Rainy.	Himálaya. Dry.	Tibet.	Remarks.
Open ...	4,500	R.	...	...	
Woods ...	7—9,000	R.	...	..	
Open ...	11,500	R.	D.	.	
Do. ...	11,000	R.	...	...	
Woods ...	7—8,500	R.	...	...	
Open ...	5—7,000	R.	...	...	
Do. ...	5,500	R.	...	...	
Do. ...	6—7,000	R.	...	...	
Do. ...	5—6,000	R.	...	...	
Do. ...	3—5,000	R.	...	...	
Do. ...	7,000	R.	...	...	
Do. ...	7—12,000	R.	...	...	
Do. ...	4,000	R.	...	...	
Woods ...	8,500 ?	R.	...	...	
Open, Wet ...	11,500	...	D.	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
27. Habenaria.						
plantaginea, *Lindl.* ...	36	H.	8"	...	August ...	Binsar ...
marginata, *Lindl.* ..	38	H.	6"	Y.	August ...	Almora ..
commelynæfolia, *Wall.*,	43	H.	1½"	Wh.	August ..	Rámganga, river
intermedia, *Don* ...	45	H.	1'—1½'	Wh.	August ...	Jágesar, Naini Tál.
pectinata, *Don* ...	46	H.	1'—2'	Y. G.	August ..	Naini Tál ...
28. Satyrium.						
nepalense, *Don* ...	30	...	...	...	...	...
29. Cephalanthera.						
acuminata, *Lindl.* ...	47	H.	9"	...	August ...	Rogila, Dudutoli
ensifolia, *Rich.* ...	48	H.	1'	...	August ...	Naini Tál ...
30. Listera.						
sp. ——— ...	49	H.	...	...	...	...
31. Epipactis.						
macrostachya, *Lindl.*,	50	H.	1'—1½'	Y. Gr.	July ...	Binsar, Naini Tál.
consimilis, *Don* ...	51	H.	1'—2'	Gr. Pr.	March ...	Kapkot, outer hills.
32. Spiranthes.						
amœna, *Bieb.* ...	52	H	6"—9"	Pk.	August ...	Naini Tál ...
33. Zeuxine.						
sulcata, *Lindl.* ...	53	H.	4"	Pk.	February,	Kota Dún ...
34. Goodyera.						
marginata, *Lindl.* ...	54	H.	6"	Pk.	August ...	Gágar, Kálimundi.
35. Cypripedium.						
cordigerum, *Don* ...	55	H.	1½'	Wh.	May ...	Pindar valley.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himálaya. Rainy.	Himálaya. Dry.	Tibet.	Remarks.
Woods ...	7,000	R.	...	...	
Open ...	5—7,000	R.	...	...	
Do. ...	3—5,000	R.	...	...	
Do. ...	5,000	R.	..	...	
Open and woods.	6—8,000	R.	...	...	
...	...	...	..	...	
Woods and open.	11,000	R.	...	...	
Woods ...	7,000	R.	...	...	
...	7,000	R.	...	...	
Woods ...	6,5—8,000	R.	...	...	
Open ...	3—5,500	R.	...	...	
Do. ...	6—7,000	R.	...	...	
Wet ...	1,500	R.	...	...	
Open ...	7—8,500	R.	...	...	
Do. ...	7,000	R.	...	...	

List of Kumaon

Names.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
CXIII.—IRIDEÆ.						
1. Iris.						
nepalensis, *Don* ...	1	H.	2"	Bl.	April ..	Almora ...
Kumaonensis, *Wall.*	2	H.	6"	Bl.	June ...	Pindari, Niti...
sulcata, *Wall.* ...	3	H.	1½"	Bl.	July ..	Pindar valley,
2. Pardanthus.						
chinensis, *Ker.* ...	...	H.	3'—4'	Sc.	June ..	Almora ...
CXIV.—AMARYLLIDEÆ.						
1. Curculigo.						
orchioides, *Gærtn.* ...	1	H.	9"	Y.	July ..	Almora ..
gracilis, *Wall.* ...	2	H.	2'—3'	Y.	August ...	Bágesar ...
2. Hypoxis.						
minor, *Don* ...	1	H.	3"	Y.	July ...	Almora, Káthi,
CXV.—DIOSCOREÆ.						
1. Dioscorea.						
deltoidea, *Wall.* ...	1	H. sc.	15'—20'	...	May ...	Naini Tál, Kapkot.
bulbifer, *L.* ...	2	H. sc.	15'	...	July ..	Almora ..
glabra, *Roxb.* ...	3	H. sc.	10'—20'	...	July ..	Bhábar, Bágesar.
pentaphylla, *L.* ...	4	H. sc.	10'	...	July ..	Almora ...
sagittata, *Roxb.* ...	5	H. sc.	10'	..	July ...	Almora ...
quinata, *Wall.* ...	6	H. sc.	3'	...	August ...	Lohá-thal ...
dæmona, *Roxb.* ...	7	H. sc.	25'	...	July ...	Sarju river ...
CXVI.—SMILACEÆ.						
1 Smilax.						
elegans, *Wall.* ...	1	S. sc.	5'—10'	Pr.	May ...	Sámkhet, Naini Tál.
sp. (*Hook cat.* No. 7),	2	S. sc	10'—15'	Pr.	May ...	Káthi Pass ...
vaginata, *Dcne.* ...	3	S. sc	2'	...	May ...	Naini Tál, Binsar.
maculata, *Roxb.* ...	4	S. sc.	10'	...	May ...	Almora, &c. ...
sp. ——— ...	5	S. sc	25'	...	July ...	Bágesar ...
ovalifolia, *Roxb.* ...	6,7	S. sc	25'	...	March ...	Kota Dún ..

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.* Rainy.	*Himalaya.* Dry.	Tibet.	Remarks.
Cultivated	5,500	R	..		
Open ...	11,5—15,500	.	D.	T.	
Do. ...	6,500	R.	...	...	
Do. ..	5—6,000	R.	..	..	
Do. ...	6,000	R.	..	...	
Woods ...	3-4,000	R.	...	...	
Open ..	5—7,000	R.	...	...	
Woods ...	3—7,500	R.	...	...	
Open ...	5,500	R.	...	...	
Woods ...	1—3,000	R.	...	.	
Open ...	5,500	R.	...	...	
Do. ...	5—6,500	R.	...	..	
Do. ...	6,000	R	.	...	
Woods ...	2,500	R.	..	...	
Open woods ...	5,5—7,500	R.	...	...	
Forest ...	8—9,000	R.	...	...	
Do. ...	7 8,000	R.	...	...	
Open ...	4-6,500	R.	...	...	
Forest ...	3-4,000	R.		...	
Do. ...	1—2,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
CXVII.—LILIACEÆ.						
1. Lilium.						
giganteum, *Wall.* ...	...	H.	6′	Wh.	June ...	Dwáli ...
Wallichianum, *Schultz*	...	H.	5′	Wh.	August ...	Almora ...
oxypetalum, *Baker* ...	...	H.	9″—12″	Gr. Y.	June ...	Pindari ...
nepalense, *Don* ...	...	H.	3′—4′	Wh.	June ...	Naini Tál ...
2. Fritillaria.						
cirrhosa, *Don* ...	...	H.	6″—12″	Gr. Y.	May ...	Champwa, Pindari.
macrophylla, *Don* ...	...	H.	2′—3′	Rose.	March ...	Almora ...
3. Tulipa.						
stellata, *Hook.* ...	...	H.	6″—18″	Wh.	Feb. ...	Almora, &c. ...
4. Lloydia.						
serotina, *Reich.* ...	1, 2	H.	3″—6″	Wh.	May to July.	Pindari Patharkori, Bomprás, Rajhoti.
5. Gagea.						
lutea, *L.* ...	...	H.	4″	Y.	May ...	Pindari ...
6. Iphigenia.						
indica, *Kth.* ...	...	H.	9″	Pr.	June ...	Almora ...
7. Gloriosa.						
superba, *L.* ...	...	H.	4′—15′	Sc. Or.	August ...	Almora, Bhábar.
8. Allium.						
Govanianum, *Wall.* ...	1	H.	9″	Wh.	June ...	Sing-jari ...
Wallichii, *Kth.* ...	2	H.	...	Pk.	June ...	China, Rálam,
victoriale, *L.* ...	3	H.	1′—2′	Wh.	June ...	Bhusar, Dudatoli.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.* Rainy.	*Himálaya.* Dry.	Tibet.	Remarks.
Woods ...	7—9,000	R.	...	...	
Open ...	4—6,000	R.	...	...	
Do. ...	11—12,500	R.	...	...	=Fritillaria sp. in Herb. S. & W.
Woods ...	7,000	R.	...	...	
Open ...	11—12,000	R.	...	...	=*Lilium* No. 2 in Herb. S. & W.
Do. ...	3, 5—6,000	R.	...	...	=*Lilium* No. 2 in Herb. S. & W.
Fields ...	3—7,000	R.	...	...	
Open ...	11—15,000	R.	D.	T.	
Open ...	11—12,000	R.	...	...	
Do. ...	1—6,000	R.	...	...	
Do. ...	1—5,000	R.	...	...	
Wet ...	11,000	R.	...	...	
Open ...	8—12,000	R.	...	...	
Woods ...	7—10,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
sp. (No. 13 *Hook cat.*),	4	H.	2′	Wh.	June	Sing-jari
rubens, *Schræd.*	5	H.	9″	Pk.	August	Rálam
sp. (No. 15 *Hook cat.*),	6, 9	H.	9″—12″	R.	June, July,	Rajhoti, Laptel, Tazang.
lineare, *L.*		...	...	.	...	...
var. junceum	7	H.	6″—8″	Pr.	August	Rákas Tál,
ellipticum, *Wall.*	8	H.	9″	Pk.	June	Juliya khal, Milam.
schœnoprasum, *L.*	10	H.	6″	?	July	Plain of Tibet ?
9. Urginea.						
indica, *Kth.*	...	H.	...	...	...	Plains
10. Asphodelus.						
fistulosus, *L.*	...	H.	...	...	January	Hardwár
11. Asparagus.						
ascendens, *Roxb.*	1	S.	6″	Wh	...	Outer hills
lævissimus, *Steud.*	2	S.	3′-4′	Wh.	July	Rámganga river
filicinus, *Ham.*	3	S.	3′—4′	Wh.	June	Sing-jari, Námik.
12. Polyonatum.						
multiflorum, *All.*	1	H.	2′—2·3	Wh.	April	Gágar Pass
roseum, *Led?*	4	H.	2½	W. V.	July	Rimkim
verticillatum, *All.*	2, 3, 6	H.	2′—3′	Wh.	April to June,	Naini Tál, Námik Kamni, Sing-jari.
sibiricum, *Red.*	5	H.	3′—4′	Wh.	May	Bágesar valley, &c.
13. Theropogon.						
pallidus, *Maxim.*	...	H.	2′	Wh.	May	Sámkhet
14. Tovaria.						
pallida, *Roxb.*	2	H.	2′—3′	Wh.	May	Dwáli
purpurea, *Wall.*	1	H.	1′—1½	Pr.	May	Mádhári Pass,

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	11,500	R.	..	...	
Do. ...	12,000	R.	...	...	
Do. ...	14—16,000	...	...	T.	
...	...	..	...	...	
Do. ...	16.500	..	.	T.	
Do. ...	10—13,000	R.	D.	T	
Do. ...	15,500 ?	...	..	T.	
Fields ...	1,000	R.	...	..	= *Scilla* No. 2 in Herb. S. and W.
Do. ...	1,000	R.	...	...	
Open ...	3—7,000	R.	...	...	
Do. ...	3—6,000	R.	...	...	
Woods ...	7—9,500	R.	...	...	
Do. ...	7—7,500	R.	...	...	
Do. ...	13,500	...	..	T.	
Do. ..	7—10,000	R.	...	...	
Open ...	4—8,000	R.	...	..	
On trees ...	6—7,500	R.	...	...	= *Chloopsis* No. 2 in Herb. S. & W.
Woods ...	8—9,000	R.	...	...	= *Smilacina* No. 2 in Herb. S. & W.
Do. ...	9—10,000	R.	...	...	= *Smilacina* No. 1 in Herb. S. & W.

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
15. Clintonia.						
alpina, *Kth.*	...	H.	1½'	Wh.	June	Kulhára
16. Streptopus.						
simplex, *Don*	...	H.	2'	...	...	Bár Pass
17. Ophiopogon.						
intermedius, *Don*	...	H.	1—1½'	Wh.	May	Naini Tál, Káthi.
18. Disporum.						
calcaratum, *Don*—var. Hamiltonianum,	1, 2	H.	2'	Gr, Y.	May	Káthi? Dwáli, Binsar.
pullum, *Salisb.*—var. parviflorum	3	H.	2'	Gr, Y.	May	Káthi
19. Tofieldia.						
nepalensis, *Wall.*	1	H.	3"—4"	Wh.	July	Patharkori
sp. (No. 2 *Hook cat.*),	2	H.	4"—6"	Wh.	July	Rajhoti
20. Paris.						
polyphylla, *Sm.*	1	H.	2'	Gr.	May	Naini Tál
sp.——	2	H.	1'	...	May	Námik
21. Trillidium.						
Govanianum, *Kth.*	...	H.	6"—9"	...	May	Madhári Pass.
CXVIII.—PONTEDERIACEÆ.						
1. Monochoria.						
vaginalis, *Presl.* 1	...	H.	1½'	Bl.	July	Almora

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the area.	Himálaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Woods ...	10—11,000	R.	...	...	
Open ...	11,000	R.	...	...	
Woods ...	7—8,000	R.	...	...	
Do. ...	6, 5—8,000	R.	...	..	
Do. ...	8,000	R.	...	...	
Open ...	10—13,500	R.	D.	...	
Do. ...	15,000	...	...	T.	
Woods ...	7—7,500	R.	...	...	
Do. ...	8,500	R.	...	...	
Do. ...	9,500	R.	...	...	
Wet ...	1—4,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
CXIX.—COMMELYNACEÆ.						
1. Commelyna.						
sp.—— ...	1, 4	H.	1¼′—1½′	Bl	August ..	Mohargári, Naini Tál.
bengalensis, *L.* ...	2	H.	1′	Bl.	August ...	Almora ...
obliqua, *Lam.* ...	3	H.	1′	Bl.	August ..	Do. ...
sp.—— ...	5	H.	1½′	Bl.	August ..	Rámári ...
communis, *Kth.* ...	6	H.	1′	Bl.	August ...	Almora ...
2. Cyanotis.						
barbata, *Kth.* ...	1	H.	3″—6″	Bl.	August ...	Naini Tál, Jágesar.
cristata, *Kth.* ..	2	H.	9″	Bl.	August ...	Almora? ...
3. Aneilema.						
nudiflora, *Kth.* ...	...	H.	6″	Bl.	August	Almora ..
scapiflora, *Wight* ...	...	H.	2′	Pk.	August ...	Jágesar, Naini Tál.
4. Dithyrocarpus.						
paniculatus, *Roxb.* ...	...	H.	1′	Pk.	August ...	Near Almora ..
5. Streptolirion.						
volubile, *Edgew.* ...	...	H. sc.	...	Pk.	September,	Dhauli river ...
CXX.—JUNCEÆ.						
1. Juncus.						
triglumis, *L.* ...	1	H.	3″	...	July ...	Rajhoti ..
sphacelatus, *Dcne.* ..	2	H.	2′	...	July ...	Laptel ..
sp.—— ...	3	H.	6″—9″	...	July ...	Barjikáng Pass.
sp —— ...	4	H.	2′	...	July ..	Milam, Rálam,
castaneus, *Sm.* ...	5	H.	2′	...	July ...	Tola ..
glaucus, *Ehrh.* ..	6	H.	2′—3′	...	June ...	Binsar, Naini Tál.
biglumis, *L.* ...	7	H,	2″	...	August ...	Barjikáng Pass.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himálaya. Rainy.	Himálaya. Dry.	Tibet.	Remarks.
Open ...	1—6,000	R.	...	...	
Do. ...	1—4,500	R.	...	...	
Do. ...	4,000	R.	..	...	
Do. ...	4,500	R.	...	...	
Do. ...	4,000	R.	..	...	
Do. ...	6—8,000	R.	...	...	
Do. ...	1—5,000	R.	...	...	
Do. ...	1—5,000	R.	...	...	
Do. ...	5—6,500	R.	...	...	
By water ...	1—4,000	R.	...	...	
Open, on bushes,	6—7,000	...	D.	...	
Open, wet ...	15,000	...	...	T.	
Do. ...	15,000	...	...	T.	
Do. ...	14,500	R.	D.	...	
Do. ...	12,000	R.	D.	...	
Do. ...	11,500	...	D.	...	
Do. ...	6—7,500	R.	...	...	
Do. ...	14,500	R.	D.	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
bufonius, *L.* ...	8	H.	9"	...	May ..	Háwalbágh ...
sp. (No. 9 *Hook. cat*),	9, 11 13	H.	3"—10"	...	May August.	Binduri, Rajhoti, Barjikáng Pass.
concinnus, *Don* ...	10	H	16"	...	August ..	Jágesar, Naini Tál.
sp. (—No. 10 *Hook. cat.*)	12	H	8"	...	August ...	Milam, Rálam,
2. Luzula.						
plumosa, *Wall.* ...	1	H.	9"	Pk.	May ...	Mádhári Pass,
campestris, *L.* ...	2	H.	3"	Pk.	May ...	Do. ...
spicata, *DC.* ...	3	H.	2"	Pk.	July ...	Bomprás ...
CXXI.—AROIDEÆ.						
1. Arisæma.						
costatum, *Mart.* ...	4	H.	1'—1½'	...	May ...	Mádhári Pass,
speciosum, *Mart.* ...	5	H.	1½'	...	May ...	Káthi ...
consanguineum, *Schott.*	6	H.	2'—3'	...	June ...	Naini Tál ...
curvatum, *Roxb.* ...	7, 9	H.	1½'—2'	...	June ...	Rampa, Jelam,
sp —— ...	8	H.	1'—2'	...	May ...	Káthi ...
Jacquemontii, *Bl.* ...	11	H.	2'	...	June ...	Naini Tál, China.
sp. (*Wall. cat.* 8920)...	12	H.	2½'	...	July ...	Rálam, Rilkot,
erubescens, *Sch.* ...	13	H.	2'—3'	...	May ...	Káthi ...
2. Sauromatum.						
guttatum, *Sch.* ...	10	H,	3'	...	July ...	Almora, outer hills.
3. Remusatia.						
Hookeriana, *Sch.* ...	2	H.	3"	...	June ..	Káthi ...
vivipara, *Sch.* ...	14	H.	1'—2'	...	September,	Bágesar, Bhim Tál
4. Colocasia.						
antiquorum, *Sch.* ...	3	H.	1'—2'	...	September,	Almora, Sarju river

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himálaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Open, wet ...	4—6,000	R.	...	...	
Do. ...	10,500 —15,000	R.	D	T.	
Do ...	6—9,000	R.	...	...	
Do. ...	11,500	R.	D.	..	
Open ...	10,000	R.	...	...	
Do. ...	10,000	R.	...	...	
Do. ...	14,500	...	D.	...	
Forest ...	7—8,000	R.	...	...	
Open ...	6 -7,500	R.	...	...	
Forest ...	6—7,500	R.	...	...	
Open ...	6—11,000	R.	D.	...	
Open ...	6—7,500	R.	...	...	
Woods ...	8,000	R.	...	...	
Open ...	9—12,000	R.	...	...	
Woods ...	6—7,500	R.	...	...	
In shade ...	3—5,000	R.	...	...	
On rocks ...	7,200	R.	...	...	
Woods ...	3—4,500	R.	...	...	
Cultivated ...	1—5,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
5. Scindapsus.						
decursiva, ***Sch.*** ...	1	H.	30′	...	...	Baisani ...
sp.—— ...	3	H.	20′	...	...	Sarju river, outer hills.
6 Typhonium.						
diversifoilum, ***Wall.***	1	H.	6″	...	July ...	Binsar, near, Almora.
7. Gonatanthus.						
sarmentosus, ***Klotsch?***	15	H.	6″—9″	...	September,	Kálimat, Binsar.
CXXII.—TYPHACEÆ.						
1. Typha.						
elephantina, ***Roxb.*** ...	...	...	8′—10′	...	...	Tarái ...
CXXIII.—LEMNACEÆ.						
1. Lemna.						
polyrhiza, ***L.*** ...	...	...	...	...	...	Almora, &c. ...
CXXIV.—NAIADEÆ.						
1. Triglochin.						
palustre, ***L.*** ...	1	H.	9″	G. R.	July ...	Tisum, Rájhoti,
maritimum, ***L.*** ...	2	H.	6″	...	July ...	Rájhoti ...
2. Potamogeton.						
natans, ***L.*** ...	1	H.	9″	...	...	Náini Tál, &c.,
lucens, ***L.*** ...	2	H.	6′	...	...	Do. ...
rufescens, ***Schrad*** ...	3	H.	6″	...	...	Rájhoti ...
crispum, ***L.*** ...	4	H.	2′	...	...	Below Almora,
perfoliatum, ***L.*** ...	5	H.	2′	...	...	Náini Tál, Bhím Tál
sp.—— ...	6	H.	2′	...	...	Above Milam,
pectinatum, ***L.*** ...	7	H.	6′	...	...	Naini Tál ...
sp.—— ...	8	H.	1′	...	...	Rájhoti ...
sp.—— ...	9	H.	1′	...	...	Above Milam,

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.* Rainy.	*Himalaya.* Dry.	Tibet.	Remarks.
On trees ..	2—4,000	R.	...	...	
Do. ...	2—4,000	R.	...	...	
Shady banks ...	4—7,000	R.	...	...	
On trees. &c, ...	5--8,000	R.	...	...	
Swamps ...	1,800	R.	...	...	
In water ...	4—6,000	R.	..	...	
Open., wet ...	15,000	...	...	T.	
Do. ...	15,000	...	...	T.	
In water ...	4—6,400	R.	...	...	
Do. ...	6,400	R.	...	...	
Do. ...	15,000	...	...	T.	
Do. ..	4,000	R.	...	...	
Do. ..	4—6,400	R.	...	...	
Do. ...	13,000	...	...	D.	
Do. ...	6,400	R.	...	...	
Do. ...	15,000	...	...	T.	
Do. ...	13,000	...	...	T.	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
CXXV.—ALISMACEÆ.						
1. Alisma.						
reniforme, *Don*	...	4	1½′	Wh.	June	Baijnáth ...
CXXVI.—ERIOCAULEÆ.						
1. Eriocaulon.						
oryzetorum, *Mart.*	1	H.	12″	Wh.	July	Háwalbágh ...
luzulæfolium, *Mart.*	2, 5	H.	4″	Wh.	July	Do. ...
hexangulare, *L,*	3	H.	4″	Wh.	July	Do. ...
(quinquangulare,)	4, 6	H.	4″—6″	Wh.	July	Do. (& Mádhári P.? 10,000 ft).
sp.—	7	H.	2″	Wh.	July	Háwalbágh ...
CXXVII.—CYPERACEÆ.						
1. Carex.						
cruciata, *Nees.*	1	...	3′	...	July	Shaidevi ...
condensata, *Nees.*	2	...	3′	...	July	Almora, Binsar, &c,
filicina, *Nees.*	...	...	...	...	...	...
var. meiogyna	3	...	2′—3′	...	May	Káthi ...
foliosa, *Don*	4	...	2′—3′	...	May	Do., Binsar...
nubigena, *Don*	5	...	1′—1½′	...	August	Binsar Rálam river.
Wallichiana, *Presc.*	6	...	1′—2′	...	March	Bhábar ...
ligulata, *Nees.*	7	...	2′	...	July	Shaidevi ...
cardiolepis, *Nees.*	8	...	4″—12″	...	May	Námik, Pindari.
hæmatastoma, *Nees.*	9	...	...	...	?	?
fusiformis, *Nees.*	10	...	1½′	...	July	Binsar ...
psychrophila, *Nees.*	11	...	1½′	...	May	Dudutoli ...
orbicularis, *Boott.*	12	...	4″—12″	...	August	Laptel ...
Moorcroftii, *Falc.*	13	...	6″—9″	...	August	Damchen, valleys of Tibet.
obscura, *Nees.*	14	...	1½—½	...	April	Rálam R.
setigera, *Don*	15	...	1′	...	April	Naini Tál
var. fasciculata	16	...	9″	...	May	Jagthána Pass,

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open, wet ...	3,500	R.	...	...	
Wet ...	1—4,000	R.	...	...	
Do. ...	1—4,000	R.	...	...	
Do. ...	1—4,000	R.	...	...	
Do. ...	1—4,000	R.	...	...	
Do. ...	1—4,000	R.	...	...	
Woods ...	6,000	R.	...	...	
Do. ...	5—7,500	R.	...	...	
...	...	...	...	...	
Open, near water.	7,500	R.	...	...	
Open, wet ...	7,200	R.	...	...	
Do. ...	75—10,500	R.	...	...	
Near water ...	1,500	R.	...	...	
Open ...	7,000	R.	...	...	
Do. ...	10—12,500	R.	...	...	
?	?	...	...	..	
Open ...	7,000	R.	...	...	
Do., wet ...	10,000	R.	...	...	
Do. ...	14—15,000	...	...	T.	
Do. ...	15—15,500	...	...	T.	
Do., wet ...	10,500	R.	...	...	
Do. ...	6,500	R.	...	...	
Do. ...	8,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
supina, *Wahl.*	17	...	3″	...	June	Bagdwár
Stracheyi, *Boott.*	18	...	1′	...	May	Below Mádhári Pass.
Essenbeckii, *Kth.*	19	...	6″—9″	...	June	Pathar-kori
gracilenta, *Boott.*	20	...	4″ 6″	...	May	Mádhári Pass,
Lehmanni, *Drej.*	21	...	6″—8″	...	August	Dung
erostrata, *Boott.*	22	...	3″—8″	...	August	Barjikáng Pass, Damchen.
nivalis, *Boott*	23	...	1½	...	August	Barjikáng Pass, Damchen, valleys of Tibet.
cruenta, *Nees.*	24	...	1′—1½′	...	August	Barjikáng Pass, Damchen.
var. mutica	25	...	6″—12″	...	August	Damchen
coriophora, *Fisch.*	26	...	8″	...	August	Balchha Pass...
2. Trilepis.						
Royleana, *Nees.*	...	...	6″	...	...	Hoti, Karnáli river.
3. Elyna.						
schœnoides, *C.A.M.*	...	...	6″	...	...	?
4. Hypoporum.						
pergracile, *Nees.*	...	...	1′	...	...	Almora
5. Hypolytrum.						
argenteum, *Vahl.*	...	...	1′	...	...	Almora
6. Fimibristylis.						
chœtorrhiza, *Nees.*	1	...	1½′	...	...	Almora
complanata, *Link.*	2	...	9″	...	...	Jágesar
pallescens, *Nees.*	3	...	6″—9″	...	...	Almora
communis, *Kth.*	4	...	2′	...	...	Binsar, Jágesar, Lohá-thal.
7. Isolepis.						
trifida, *Nees.*	1	...	6″—8″	...	...	Lohá-thal, above Jalat.
setacea, *R. Br.*	2	...	6″	...	...	Near Milam.
barbata, *R. Br.*	3	...	4″	...	...	?

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open, wet	8,000	R.	...	...	
Near water	8,000	R.	...	...	
Open	11,000	R.	...	...	
Do , wet	10,000	R.	...	...	
Do.	13,500	...	D.	...	
Do.	14,5—15,500	R.	...	T.	
Do.	14,5—15,500	R.	...	T.	
Do.	14,5—15,500	R.	...	T.	
Do.	15,000	...	D.	T.	
Near water	16,500	...	...	T.	
Open, wet	15,500	...	...	T.	
?	?	...	...	...	
Wet	4,000	R.	...	...	
Near water	4—5,000	R	...	...	=*Lipocarpha* in Herb. S. & W.
Open	5,500	R.	...	...	
Do.	7,500	R.	...	...	
By water	4,000	R.	...	...	
Wet	6—7,500	R.	...	...	
Do.	5—7,500	R.	...	...	
Do.	12,500	...	D.	...	
?	?	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower	Time of flowering.	Locality.
8. Scirpus.						
mucronotus, *L.*	1	...	3′	...	...	Lohá-thal, Almora, &c.
sylvaticus, *L.*	2	...	...	...	...	?
lacustris, *L*	3	...	10′	...	...	Bhim Tál
9. Schœnus.						
compressus, *Panz.*	...	...	6″	...	...	Karnáli river
10. Eleocharis.						
palustris? *R. Br.*	...	...	9″—12″	...	...	Jágesar
11. Eriophorum.						
comosum, *Wall.*	...	...	2′—3″	...	...	Bhábar, Almora, Bágesar, Ramganga river.
12. Cyperus.						
angulatus, *Nees.*	1	...	4″	...	...	Lohá-thal
aristatus, *Rottb.*	2	...	...	...	...	?
pumilus, *L.*	3	...	4″—6″	...	...	Almora,
niveus, *Retz.*	4	...	6″—12″	...	...	Ditto, Naini Tál.
Eragrostis, *Vahl.*	5	...	1′—1½′	...	...	Ditto, Sába
polystachyus, *Rottb.*	6	...	1½′	...	...	Ditto, Lohá-thal
rotundus, *L.*	7	...	1½′	...	...	Ditto
exaltatus, *Ret*	8	...	3′—4′	...	...	Ditto, Kapkot,
corymbosus, *Rottb*	9	...	4′	...	...	Ditto
Iria, *L.*	10	...	2′—3′	...	...	Ditto, Kosi river, Naini Tál.
pilosus? *Vahl.*	11	...	2′—3′	...	...	Almora
distans, *L*	12	...	...	...	...	?
13 Kylingia.						
gracilis, *Wall.*	1	...	1′—1½′	...	...	Shaldevi
monocephala, *L.*	2	...	4″	...	...	Jágesar
cylindrica, *Nees.*	3	...	4″	...	...	?

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himâlaya. Rainy.	Himâlaya. Dry.	Tibet.	Remarks.
Wet	3,5–6,000	R.	...	...	
..	4,000	R.	..	...	
In water	4–4,400	R.	...	...	
Open	15–16,000	...	...	T.	
Wet	7,500	R.	...	...	
Dry banks	4,500	R.	...	...	=*Trichophorum* No. 1 & 2 in Herb. S. & W.
Wet	6,000	R.	...	...	
...	4—6,000?	R	...	...	
Wet	4,000	R.	...	...	
Open, dry	5—7,000	R.	...	...	
Wet	5—9,000	R.	...	...	
Do.	4–6,000	R	...	...	
Do.	4,000	R.	...	...	
Do.	3 - 4,000	R.	...	...	
Do.	4,000	R.	...	...	
Do.	4—6,000	R	...	...	
Do.	4,000	R.	...	...	
...	4,000?	R.	...	...	
Open	7,000	R.	...	...	
Do.	5–6,000	R.	...	...	
...	?	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
14. Mariscus.						
umbellatus, *Vahl.* ...	1	...	2′	...	...	Almora ...
puniceus, *Link.* ...	2	...	1′	...	...	Do. ...
CXXVIII.—GRAMINEÆ.						
1. Oryza.						
sativa, *L.* ...	...	...	...	...	...	Almora, &c. ...
2. Zea.						
Mays, *L.* ...	...	...	...	...	...	Almora, &c. ...
3. Coix.						
lachryma, *L.* ...	...	...	4′	...	...	Bágesar, Almora.
4. Alopecurus.						
fulvus, *Sm.* ...	...	...	1′	...	...	?
5. Phleum.						
alpinum, *L.* ...	1, 2	...	1¼′	...	...	Rálam ...
6. Phalaris.						
minor, *Retz.* ...	...	...	...	...	...	Sirmoria ...
7. Hierochloa.						
laxa, *R. Br.* ...	...	...	2′	...	...	Pindari : above Milam.
8. Paspalum.						
scrobiculatum, *L.* ...	1	...	...	...	...	?
Royleanum, *Nees.* ...	...	...	...	...	...	?
filiculme, *Nees.* ...	...	...	...	...	...	Almora ...
9. Milium.						
effusum, *L.* ...	...	...	...	...	...	Mádhári Pass,

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	5,500	R.	...	...	
Do. ...	5,500	R.	...	...	
Cultivated ...	1—6,000	R.	...	...	
Do. ...	1—7,000	R.	...	...	
Open, wet ...	1—5,000	R.	...	...	
Open ...	1—5,000	R.	...	...	
Do. ...	7—11,000	R.	...	...	
Do. ...	4,000	R	...	...	
...	12—13,000	R.	D.	...	
Do. ...	1—5,500	R.	...	...	
Do. ...	5,500	R.	...	...	
Do. ...	5,500	R.	...	...	
Do. ...	8,500	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
10. Digitaria.						
*sanguinalis	1	...	2′	...	...	Almora
*commutata, *Nees.*	2	...	...	...	...	Almora
*cruciata, *Nees.*	3	...	...	...	...	?
11. Panicum.						
*flavidum, *Retz.*	1	...	...	...	...	Somesar
*miliaceum, *L.*	2	..	2′—3′	...	...	Almora
*Helopus, *Trin.*	3	...	1′	...	...	Do.
*vestitum, *Nees.*	4	...	9′	...	...	Do.
*psilopodium, *Trin.*	5	...	2′	...	...	Jágesar
*frumentaceum, *Roxb.*	6	...	...	...	...	Almora
12. Urochloa.						
semialata, *Kth.*	...	...	...	...	...	Binsar
13. Thysanolæna.						
Agrostis, *Nees.*	...	...	6′—8′	...	...	Ramganga river, Kota river,
14. Isachne.						
albens, *Trin.*	1	...	1¼′	...	...	Girgaon
muricata, *Nees.*	2	...	1½′	...	...	Somesar, near Almora.
15. Oplismenus.						
Crus-Galli, *Kth.*	1, 2,		2′	...	...	Almora, Gori valley.
*undulatifolius, *R. & S.,*	3	...	1′	...	...	Jágesar
16. Pennisetum.						
*triflorum, *Nees.*	...	...	2′	...	...	Almora
sp.——	...	...	1½	...	...	Jelam, Niti
17. Penicillaria.						
*spicata, *Lamk.*	...	...	...	...	...	Almora

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himalaya. Rainy.	Himalaya. Dry.	Tibet.	Remarks.
Open ...	1—5,500	R.	...	...	
Do. ...	5,500	R.	...	...	
...	5,500	R.	...	...	
Open ...	1—5,000	R.	...	...	
Cultivated ..	1—5,000	R.	...	...	
Open ...	5,500	R.	...	...	
...	5,500	R.	. .	...	
	1—6,000	R.	...	...	
Cultivated ...	1—6,500	R.	...	...	
Open ...	6,500	R.	...	...	=*Coridochloa* in Herb. S. & W.
Do. ...	2—5,000	R.	...	...	
Do. ...	6,000	R.	...	...	
Do. ...	4—5,000	R.	...	...	
Do. ...	1—6,000	R.	. .	...	
Shade ...	6,000	R.	...	...	
Open ...	5,500	R.	...	...	
Do. ...	9—11,000	R.	...	...	=*Gymnothrix* in Herb. S & W.
Do. ...	5,500	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
18. Setaria.						
glauca, *Beauv.* ...	1,	...	2′	...	...	Near Almora ...
verticillata, *Benth.* ...	2,	...	2′	...	...	Naini Tál ...
italica, *Kth.* ...	3,	...	3′	...	...	Almora ...
viridis, *Beauv.* ...	4,	...	2′	..	...	? ...
19. Piptatherum.						
soongaricum, ...	1,	...	1½′	..	...	Shelshel river,
æquiglume, *Munro,* ...	2,	...	...	..	...	? ...
20. Lasiagrostis.						
mongholica, *Trin.* ...	...	...	1½′	...	...	Shibchilam ...
21. Stipa.						
pallida, *Munro* ...	...	...	1½′	...	...	Plains of Tibet,
22. Aristida.						
cyanantha, *Nees.* ...	...	...	2′	...	...	Almora ...
23. Sporobolus.						
elongatus, *R.Br.* ...	...	...	...	...	...	Almora, Jágesar.
24. Agrostis.						
alba, *L.* ...	1,	...	...	...	...	?
Royleana, *Nees.* ...	2,	...	...	...	...	Almora ...
ciliata, *Nees.* ...	3, 4,	...	2′	...	...	Rálam river ... Barjikáng Pass,
Roylei, *Trin.* ...	5,	...	..	...	...	Above Námik,
25. Polypogon.						
monspeliense. L. ...	1	...	...	...	...	Bhábar, below Almora.
Sp. (P fugax, *Nees*),	2	...	...	...	...	Almora ...
26. Calamagrostis.						
nepalensis, *Nees.* ...	...	...	3′	...	...	Above Jalat, Dwáli.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himálaya.		Tibet.	Remarks.
		Rainy.	Dry.		
Open	1—4,000	R.	...	...	
Do,	6,500	R.	..	...	
Cultivated	1 - 6,500	R	...	...	
Open	6,000?	R.	...	...	
Do.	14,500	...	...	T.	
Do.	14,500	...	...	T	
Do.	14,500	...	...	T.	
Do.	15,000	...	...	T.	
Do.	4—5.000	R.	...	...	=*Chataria* in Herb S & W.
Wet	5—7,500	R.	...	...	= *Vilfa diandra*. in Herb, S & W.
...	?	R.	...	...	
Open	5,500	R.	...	...	
Wet	11,000 —1,41.500	R.	...	...	
...	10,000	R.	...	...	
Water	1—4,500	R.	...	...	
Open	5,500	R.	...	...	
Do.	7, 5—9,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
27. Deyeuxia.						
compacta, *Munro, M S*	1	...	1"	...	...	Valleys of Tibet.
scabrescens, *Munro, M S.*	2	...	2'	...	...	Pindari, Milam.
28. Arundo.						
madagascariensis, *Kth.*	...	...	...	...	...	Almora, Bamoth
29 Phragmites.						
Roxburghii, *Steud.* ...	...	...	10'	...	...	Bhím Tál, Bhábar.
30. Arundo.						
benghalensis, *Retz.* ...	...	...	8'	...	...	Kapkot, Jalat,
31. Cynodon.						
Dactylon, *Pers.* ...	...	...	1'	..	...	The plains, Sirmoria, Almora.
32. Eleusine.						
corocana, *Pers.* ...	1	...	2'	...	...	Almora ..
*var. stricta ...	2	...	2'	...	..	Do. ...
indica, *Gaertn.* ...	3	...	1½'	...	...	Jalesar, Almora, below Jalat.
33. Deschampsia.						
cæspitosa, *Beauv.* ...	...	...	6"—18"	...	...	Laptel river, Balchha Pass.
34. Trisetum.						
aureum, *Nees.* ...	1	...	1'—2'	...	...	Milam, Tola ...
subspicatum, *Beauv.*	2, 4, 5	...	3"—4"	...	...	Balchha Pass, valleys of Tibet.
virescens, *Nees.* ...	3	...	2'	...	...	Mokargári ...
35 Avena.						
sativa, *L.* ...	...	...	...	...	...	Almora ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	15,000	...	...	T.	
Wet ...	11,500	R.	D.	...	
Open ...	1—5,000	R.	...	...	
Water ...	1—4,400	R.	...	...	
Open ...	1—5,000	R.	...	...	=*Amphidonax* in Herb. S & W.
Do. ...	1—5,500	R.	...	...	
Cultivated ...	1—5,500	R.	...	...	
Do. ...	4,000	R.	...	...	
Open ...	5—6,000	R.	...	...	
Do. ...	14—16,500	...	...	T.	
Do. ...	11—12,000	...	D.	...	
Open ...	12—16,500	R.	...	T.	
Woods ...	6,500	R.	...	...	
Fields ...	5,500	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
36. Danthonia.						
kashmiriana ...	1, 2	...	1′—2′	...	...	Milam, Rálam, Níti, near Tola.
37. Poa.						
tibetica, *Munro.* ...	1	...	1¼′	...	...	Plains of Tibet
*pratensis, *L* ...	2	..	1½′	..	...	Do. ...
*Royleana, *Nees.* ...	3	...	1′	...	...	Kulhara ...
*bulbosa, *L.* ...	4	...	4″—6″	...	...	Topidhunga ...
*var, vivipara. ...	5	...	6″—9″	...	...	Do. ...
*annua, *L.* ...	6	...	6″	...	...	Kulhara ...
*flexuosa, *Wahl.* ...	7	...	6″	...	...	Pindari ..
var.—— ...	8	...	1′	...	...	Milam, Jungbwatál.
sterilis, *Bieb.* ...	9	...	...	...	...	Barjikáng ...
*nemoralis, *L.* ...	10	...	...	...	...	Níti ...
*serotina, *Ehr,* ...	11	...	...	...	...	Dúgli ...
*alpina, *L.* ...	11	...	...	...	...	Do. plains of Tibet.
nepalensis, *Wall.* ...	...	...	...	...	...	Binsar ...
38. Eragrostis.						
Brownei, *Nees.* ...	1, 2, 3	...	...	...	...	Sirmoria ...
elegantula, *Kth.* ...	4	...	...	...	...	? ...
verticillata, *Nees.* ..	5	...	1½′	...	...	Háwalbágh ...
amabilis, *W. & A.* ...	5	...	1′	...	...	Almora ...
bifaria, *W & A.* ...	7	...	1′	...	...	Do. ...
*megastachya, *Link.*	8	...	2′	...	...	Do. ...
nigra, *Nees.* ...	9	...	2′—3′	...	...	Above Jalat, Kálimundi Pass.
39. Melica.						
micrantha, *Griesb.* var. inæqualis.	...	...	8′	...	...	Níti ...
40. Kœleria.						
cristata, *Pers.* ...	...	...	1½′		...	Naini Tál, Káthi.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himá-laya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	11—12,000	R.	D.	...	
Do. ...	16,000	..	...	T.	
Do. ...	15,000	.	...	T.	
Do. ..	10,500	R.	. .	...	
Do. ...	14,500		D.	...	
Do. ...	14,500	. .	D.	...	
Do. ...	10,500	R.	...	...	
Do. ..	12,000	R	...	...	
Do. ...	12,—15,500	...	...	T.	
Do. ...	13,500	R.	...	...	
Do. ...	12,000	...	D.	...	
Do. ...	10,500	R.	...	...	
Do. ...	10,—15,500	R.	...	T.	
Do ...	7,000	R.	...	...	
Do. ...	4,000	R.	...	...	
..	4,000	R.	...	...	
Open ...	4,000	R.	...	...	
Do. ...	5,000	R.	...	...	
Do. ...	5,000	R.	...	...	
Do. ...	5,500	R.	...	...	
Woods ...	7,500	R.	...	...	
Open ...	11,500	...	D.	...	
Do. ...	6—7,500	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
41. Dactylis						
glomerata, *L.*	...	...	3′	...	...	Naini Tál, Káthi, Jalat, Jhuni.
42. Tripogon						
filiformis, *Nees.*	1, 2	...	1′	...	...	Ditto, Thákil, above Jalat.
43. Festuca						
*elatior, *L.*	3	...	...	...	...	Binsar ...
sp. ——	...	...	4′	...	...	Ditto, Káthi, &c
*pumila, *Vill.*	1	...	6″	...	...	Valleys of Tibet
sp. ——	2	...	9″	...	...	Ditto ditto, Chorhoti Pass.
sp ——	...	...	1½′ 2′	...	...	Plains of Tibet,
44. Bromus						
giganteus, *L.*	1	...	4′	...	...	Dwáli ...
confinis, *Nees.*	2	...	2½′	...	..	Rálem ...
arvensis, *L.*	3	...	1½′	...	...	Above Jhuni,
*tectorum, *L.*	4	...	1′-1½′	...	...	Milam ...
45. Brachypodium						
scaberrimum, *Nees.*	...	...	1′-1½′	...	...	China, Naini Tál.
46. Dendrocalamus						
strictus, *Nees.*	...	...	20′-30′	...	...	Bhábar ...
47. Arundinaria						
falcata, *Nees.*	...	...	15′	...	...	Naini Tál, &c,
sp. ——	...	...	20′	...	...	Ramni. Duduтoli

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	6—8,000	E.	...	...	
Rocks open ...	7—8,700	R.	...	...	
Woods ...	7,500	...	...	...	
Do. ...	7—8,000	R.	...	...	=*Schænodorus* No. 1 in Herb. S. & W.
Open ...	15,000	...	...	T.	
Do. ...	15—16,000	...	D.	T.	
Do. ...	15,000	...	...	T.	=*Schænodorus* No. 2 in Herb. S. & W.
By water ...	8,000	R.	...	...	
Open ...	12,000	R.	...	...	
Do. ...	7,700	R.	...	...	
Do. ...	11,000	...	D.	...	
Do. ...	8,000	R.	...	...	
Open woods ...	1—2,500	R.	...	...	
Forest ...	5—7,000	R.	...	...	=*Ludolfia* No. 1 in Herb S. & W.
Do. ...	8—11,000	R.	...	...	=*Ludolfia* No. 2 in Herb. S. & W.

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
48. Thamnocalamus.						
Falconeri, *Munro* ...	...	...	20′	...	...	Malhári Pass, Dugli.
spathiflorus, *Munro*...	...	...	30′	...	...	Ukhimath ...
49. Bambusa.						
Falconeri, *Munro* ...	2					
50. Lolium.						
*temulentum, *L.* ...	...	...	2′—3′	...	...	Sirmoria ...
51. Triticum.						
*vulgare, *Vill.* ...	...	...	2′	...	..	Niti, &c. ...
* var villosum ...	...	...	2—2½	...	...	Milam, &c. ...
longiaristatum ...	...	...	1½′—2′	...	...	Milam, Plain of Tibet
caninum, *L.* ...	...	...	2′	...	...	Almora ...
52. Agropyrum.						
semicostatum, *Nees,*	1,5	...	2′—3′	...	...	Almora, Milam, Karnáli river.
sp.—— ...	4	...	1½′	...	...	Almora ? ...
sp.—— ...	7	...	1½′	...	...	Gothing ...
53. Elymus.						
*sibiricus, *L.* ...	1	...	2′	...	...	Plains of Tibet,
sp —— ...	2	...	2′—2½′	...	...	Milam, Pindari, Topidhunga.
dasystachyus, *Trin.*...	3	...	3′	...	...	Laptel ...
54. Hordeum.						
pratense, *L.* ...	3	...	1½′—2′	...	...	Shib Milam ...
*vulgare, *L.* ...	1, 2	...	2½′	...	...	Plains, Niti, Milam, Kyunlung.
55. Mnesithea.						
lævis, *Kth.* ...	...	...	2′	...	...	?

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.* Rainy.	*Himalaya.* Dry.	Tibet.	Remarks.
Forest ...	7—8,500	R.	...	...	=*Bambusa* No. 1 in Herb. S. & W.
Open woods ...	4,000	R	...	...	
Corn fields ..	4,000	R.	...	...	
Cultivated ..	1—11,500	R.	D.	...	
Do. ..	11,500	..	D	...	
Open ..	12,5—16,000	R.	...	T.	= *Agropyrum* Nos 2 & 3 in Herb. S W.
Do. ..	6,500	R	...	...	=*Agropyrum* No. 6 in Herb. S. & W
Do. ...	5—15,000	R.	D.	T.	
Do. ..	5,500	R.		...	
Do. ..	12,000	...	D.	...	
Do. ...	15,000	...	...	T.	
Do. ..	12—15,000	R.	D.	...	
Do. ..	14,500	...	...	T.	
Do. ...	14,500		...	T.	
Cultivated ..	1—14,000	R.	D	T.	
Open ...	1—4,000	R	D.	...	=*Hemarthria* in Herb. S. & W.

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
56. Rottboellia.						
exaltata, *L.* ...	...	...	10′	...	...	Háwalbágh ...
57. Manisuris.						
granularis, *Swartz.* ...	...	...	...	...	...	Almora ...
58. Perotis.						
latifolia, *Ait.* ...	...	...	1′—2′	...	...	Below Almora,
59. Eriochrysis.						
Narenga, *Nees* ...	...	...	6′	...	...	Sarju valley ...
60. Saccharum.						
Sara, *Roxb.* ...	...	...	3′—4′	...	...	?
officinarum, *L.* ...	...	...	5′—8′	...	...	The plains, Almora.
61. Imperata.						
Kœnigii, *Beauv.* ...	1, 2	...	3′—6′	...	...	Bhábar, Almora, Shaldevi, Sarju valley.
62. Pogonatherum.						
polystachyum, *R.&S.*	...	...	1′	...	...	Sarju river near Almora.
63. Erianthus.						
velutinus, *Munro* ...	...	...	3′	...	...	Almora near Jalat.
rufipilus, *Griseb.* ...	2	...	3′—4′	...	...	Naini Tál, Gágar pass
Jacquemontii, *Munro,*	3	...	3′—4′	...	...	Above Kota, Rámganga river.
*rufus, *Nees* ...	4	...	2′	...	...	Below Jalat ...
sp.—— ..	5	...	3′	...	...	Almora, above Jalat.
64. Eulalia.						
nepalensis, *Trin.* ...	...	...	2′	...	...	Naini Tál ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	1—4,500	R.	...	...	
Do. ..	1—4,500	R.	..	...	
Do. ...	4,500	R.	...	...	
Do. ...	1—3,500	R.	...	...	=*Saccharum* No. 1 in Herb. S. & W.
?	?	R.	...	...	= *Erianthus* No. 1 in Herb. S. & W.
Cultivated ..	1—5,000	R.	...	...	
Open ...	1—7,200	R.	...	...	
Do. ...	1—4,000	R.	...	...	
Do. ...	5—6,000	R.	...	...	=*Pollinia* No. 1 in Herb. S. & W.
Woods ...	7,500	R.	...	...	
Open ..	2,5—5,500	R.	...	...	
Do. ...	5,000	R.	...	...	
Do. ...	5—7,000	R.	...	...	
Woods ...	7,500	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
65. Pollinia						
Lehmanni, *Nees* ..	2	...	2′—3′	...	...	Almora, near Jalat.
66. Anthistiria						
anathera, *Nees* ...	1	...	2′—3′	...	..	Almora, below Jalat
ciliata, *L. f.* ...	3	...	3′	...	...	Above Jalat ..
67. Androscepia						
gigantea, *Brogn* ...	...	...	15′	...	...	Keta, Almora,
68. Apluda.						
aristata, *L.* ...	1	...	2′—3′	...	...	Almora ..
var.——	2	...	2′—3′	...	...	Do. ...
69 Batrarctherum						
lanceolatum, *Nees* ...	1	...	1′	...	...	Almora ..
submuticum, *Nees* ... plumbeum ... }	2	...	1′	...	...	Do ...
molle, *Nees* ...	3	...	1′	...	...	Below Almora,
70. Hologamium.						
nervosum, *Nees* ...	...	...	3′—4′	...	...	Below Almora,
71. Gymnandropogon.						
annulatum ...	...	...	2′—3′	...	...	Kálidhungi ...
triste ...	...	...	4′	...	...	Above Jalat ...
72. Anatherum.						
muricatum, *Beauv.* ..	...	...	6′—7′	...	...	Bhábar ...
73. Sorghum.						
muticum, *Nees* ...	1	...	4′	...	...	Bágesar ...
halepense, *Pers.* ...	2	...	...	...	...	Bhábar ...
vulgare, *Pers.* ...	3	...	...	...	...	Almora ..
74 Heteropogon.						
contortus, *Nees* ...	1	...	2′	...	...	Almora ...
melanocarpon ...	2	...	4′	...	...	Do. ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	5,500	R.	...	...	
...	4–5,500	R.	...	...	
.	7,500	R.	...	...	
[illegible] .	[illegible]	R.	...	...	= *Anthistiria* No 2 in Herb. S. & W.
Do ..	1–5,500	R.	...	...	
Do. ..	5,500	R.	...	...	
Do ...	4,500	R.	...	..	
Do ...	4,500	R.	...	...	
Do. ..	4,000	R.	...	...	
Do. ...	4,500	R.	...	..	
Do. ..	1,000	R	...	...	= *Lepeocercis* in Herb S. & W.
Do. ...	7,500	R.	..	...	= *Andropogon* No. 1. in Herb. S. & W.
Do. ..	1—2,000	R.	...	...	
Do. ...	3,000	R.	...	...	
Do ...	1—3,000	R.	...	...	
Cultivated ...	5,000	R.	...	...	
Open ...	1—6,000	R.	...	...	
...	5,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
75. Andropogon.						
pachnodes, *Trin.* ...	3	...	5′	...	...	Adhbadri, &c,
*Iwarancusa, *Roxb.*	7	...	...	...	...	Bhábar and low valleys.
76. Cymbopogon.						
distans ...	...	...	3′—4′	...	...	Naini Tál ...
Gidarba, *Ham.* ...	...	...	3′—4′	...	...	Kálimath, Naini Tál.
laniger	...	...	4′—5′	...	...	Kálapathar ...
77. Chrysopogon.						
montanus, *Trin.* ...	7	...	3′	...	...	Almora? ..
serrulatus, *Trin.* ...	1	...	2—3	...	...	Almora ..
cœruleus *Nees* ...	2	...	2′	...	...	Do. ..
Gryllus, *Trin.* ...	3, 4, 5,	...	3′—4′	...	...	China, Binsar Páton.
villosus, *Nees* ...	6	...	1½′	...	...	Below Jalat ..
78. Garnotia.						
polygonoides, *Wight*,	...	...	...	...	...	Near Jalat ..
79. Ischæmum.						
speciosum, *Nees* ...	...	...	3′	...	...	Almora ..
var. —— ..	...	...	2′—2½′	...	...	Naini Tál ..
80 Spodiopogon.						
angustifolius, *Nees* ..	...	...	2′	...	...	Naini Tál? ..

I find the following note by Mr. C. B. Clarke at the end of his MS. list
unequal. I have turned over the bundles marked "Ind Or" or "Cosmop li
have been worked by Gen. Munro, some are passing through his hands, some not
large residuary bundles marked "spp." and in these sometimes the Strachey
many other cases where the Strach. and Winterb. plant is found in a particular
since the ticket was put on, and it may have been hastily sorted into the bundle
very partially renamed.—*Triticum* seems not to have been touched since the list
Even where the genera have been thoroughly worked and written up, it would
part of *Bambusa*, sp. 2., into *Bambusa*, part into *Thamnocalumus*, but it would
were not cut by Strachey from the same plant.

Kew, 11*th November*, 1879.

The names which are not included in Mr. Clarke's list are marked with an asto-
mentioned, he did not come across in the Kew Herbarium.

Plants—(continued).

Condition of soil, &c.	Elevation in feet above the sea.	*Himalaya.* Rainy.	*Himalaya.* Dry.	Tibet.	Remarks.
Open ...	2–4,500	R.	...	...	
Do. ...	1—4,000	R.	...	...	
Do ...	4–8,000	R.	...	...	=*Andropogon* No. 2 in Herb. S. & W.
Do. ...	6–8,000	R.	...	...	=*Andropogon* No. 4 in Herb. S. & W.
Do. ...	2,500	R.	...	...	=*Andropogon* No. 5 in Herb. S & W.
Do. ...	5,500	R.	...	...	=*Andropogon* No. 6 in Herb. S. & W.
Do. ...	5,300	R.	...	...	
Do. ..	5,500	R.	...	...	
Do. ...	5 8,700	R.	...	...	
Do. ...	5,000	R.	...	...	
Do. ...	7 000	R	...	...	=Nov. Genus near *Polypogon* in Herb. S. & W.
Do. ...	5—8,000	R.	...	...	
Do. ..	5,000 ?	R.	...	...	
Do. ...	6,000	R.	...	...	

of grasses of the S and W Herbarium " The above reduction of the Grasses is tan," not any others (in general). The grasses are in various states; some yet touched, or at all events not yet written up. To " .ny of the genera are and Winterbottom tickets remain. In this case they cannot be reduced, but in bundle (with a name outside) there is no sign that the plant has been examined merely as being "*inter affines*" From these various causes the grasses are only was made. Why I found all the *Eragrostis* and very little of the *Poa* I cannot guess take a long time to verify the species carefully; thus Gen. Munro has sorted nevertheless take me some time to assure myself that the two pieces of No. 2

C. B. CLARKE.

risk. Amongst these are no doubt several, such as from the various causes above

J. F. D.

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
CXXX—FILICES.*						
1. Gleichenia.						
linearis, *C. B. Clarke,*	...	...	2′—3′	...	...	Rámganga valley, &c.
2. Woodsia.						
elongata, *Hook.* ...	1	...	6″—12″	...	...	Kálimundi, Bagdwár.
lanosa, *Hk. & Baker*...	2	...	2″	...	...	Pindari ...
sp.—— ...	3	...	3″—4″	...	...	Pindar and above Námik.
3. Dicksonia.						
appendiculata, *Wall.*	...	...	3′	...	...	Gori valley, Karim.
4. Hymenophyllum.						
exsertum, *Wall.* ...	1	...	4″	...	...	Madhári Pass,
polyanthus, *Swartz.* ...	2	...	2′—3′	...	...	Dwáli, Námik,
5. Davallia.						
polypodioides, *Don* ...	1	...	2′	...	...	Rámganga river.
chinensis, *Swartz.* ...	2	...	1′—2′	...	...	Bágesar ...
membranulosa, *Wall.*	3	...	3″	...	...	Mohargéri ..
pulchra, *Don* ..	4	...	1½′	...	...	Rámganga river, Binsar.
immersa, *Wall.* ...	5	...	6″—9″	...	...	Binsar ...
6. Cystopteris.						
fragilis, *Bernh.* ...	...	...	6″—9″	...	...	Topidhunga, Sangchá.
7. Adiantum.						
Capillus-Veneris, *L.* ...	1	...	1′	...	...	Jagthána ..
venustum, *Don* ...	2	...	1½′	...	...	Naini Tál, &c.,
pedatum, *L.* ...	3	...	1′	...	...	Dwáli, Singjari.
caudatum, *L.* ...	4	...	1′—2′	...	...	Bágesar, Pharka.
var. rhizophorum...	6	...	6″—12″	...	...	Jagthána, Binsar.
lunulatum, *Burm.* ...	5	...	1′—1½′	...	...	Sarju river, Bhim-Tál.

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* These have been arranged as far as possible in accordance with Mr. C B. Clarke's

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	3—6,000	R.	...	...	
Forest ...	8,000	R.	...	...	
Open ...	12,000	R.	...	...	
Do. ...	11—12,000	R.	...	...	
Shade ...	5—7,000	R.	...	...	
Wet rocks ..	8,000	R.	...	...	
Trees and rocks,	8—9,000	R.	...	...	
Banks ...	2,500	R.	...	...	
Do. ...	3,000	R	...	...	
Do. ...	6,500	R	...	...	
Trees ..	4,5—7,500	R.	...	...	
Rocks ...	6—7,000	R.	..	...	
Do. ...	14—15,000'	...	D.	T.	
Rocks near water.	3—5,000	R.	...	...	
Forest ..	6—8,000	R.	...	...	
Do. ...	9—10,000	R.	..	...	
Banks ...	3—6,500	R.	...	...	
Do. ...	4—8,000	R.	...	...	
Do. ...	3—4,500	R.	...	...	

recently published "Review of the Ferns of Northern India."

J. F. D.

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
8. Cheilanthes.						
farinosa, *Kaulf.* ...	1	...	1′—1½′	...	...	Bágesar, Almora, &c.
sp.—— ...	2	...	1′	...	...	Pharka ...
sp.—— ...	3	...	1″	...	...	Mohargári ...
9. Onychium.						
japonicum, *Kunze* ...	2	...	2′	...	...	Naini Tál &c.,
var. multisecta ...	1	...	1½′	...	...	Do. ...
10. Cryptogramme.						
crispa, *R.Br.* ...	1 & 2	...	3″—4″	...	...	Champwa, Tola, Rálam.
11 Pellæa.						
calomelanos, *Link.* ...	...	...	6″	...	...	Below Almora.
12. Pteris.						
pellucida, *Presl.* ...	...	...	...	...	...	...
var. stenophylla ...	1	...	1′—1½′	...	...	Bágesar ...
cretica, *L.* ..	2	...	2′	...	...	Naini Tál, Káthi,
longifolia, *L.* ...	3	...	3′	...	...	Sarju river ...
quadriaurita, *Retz.* ...	4, 5, 6	...	1′—3′	...	...	Bágesar, Jalat, Pharka, Barmdeo.
sp.—— ...	...	...	3′—4′	...	...	Káthi, &c. ...
Wallichiana, *Agardh.*,	...	...	4′—6′	...	...	Bagdwár ...
13. Woodwardia.						
radicans, *Smith* ...	...	...	6′	...	...	Pyúra, &c. ...
14. Asplenium.						
Nidus, *L.* ...	1	...	1½′—2′	...	...	Rámganga river.
ensiforme, *Wall.* ...	2	...	1½′	...	...	Káthi ...
alternans *Wall.* ...	3	...	4″—6″	...	...	Bágesar, Almora.
septentrionale, *L.* ...	4	...	4″	...	...	Milam, Níti ...
viride, *Huds.* ...	5	...	3″—4″	...	...	Pindari ...
Trichomanes, *L.* ...	6	...	3″—4″	...	...	Milam ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya*		Tibet.	Remarks.
		Rainy.	Dry.		
Rocks ...	3—7,500	R.	...	...	
Do. ...	6,500	R.	...	...	
Banks ..	4.500	R.	...	...	
Forest ...	6—8,000	R.	...	...	
Do. ..	6—8,000	R	...	...	
On rocks ...	10—12,000	R.	...	...	
Dry rocks ...	4,000	R.	..	...	= *Allosorus* No. 1 in Herb. S. & W.
...	...	...	...	...	
Forest ...	3,000	R.	...	...	
Do. ...	3—7,000	R.	...	...	
Do. ...	2—4,000	R.	...	...	
...	...	...	...	...	
Open ...	7—8,000	R.	...	..	= *Allosorus* No. 2 in Herb. S. & W.
Forest ...	8,000	R.	...	...	= *Campteria* in Herb. S. & W.
Wet banks ...	4—6,500	R.	...	...	
On trees ...	2,500	R.	...	...	
Do. ...	8,000	R.	..	...	
Banks ...	3—6,000	R.	...	...	
Rocks ...	11,—12,000	...	D.	...	
Do. ...	12,000	R.	...	...	
Do. ...	11,500	...	D.	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
falcatum, *Sw.*	...	...	1½′–2′	...	...	Dwáli, Naini Tál.
sp.——	7	...	4″-6″	...	...	Jágesar ...
laciniatum, *Don*	8	...	10″	...	...	Ják, upper Tola.
varians, *Hk. & Grev.*	9	...	...	...	...	Dwáli ...
sp.——	..	.	2′	..	...	Naini Tál ...
Filix-fœmina, *Bernh.*,	...	..	1′–2′	..	..	Do. ...
var. pectinata	...	...	2½′	..	...	?
sp.——	...	...	1½′–2′	...	..	Jágesar ...
esculentum, *Presl.*	...	...	3′–4′	...	...	?
sp.——	..	...	3′–4′	...	...	Gori valley ...
japonicum, *Thunb.*	...	..	1½′	...	...	?
sp.——	...	...	2′	...	...	Káthi ...
15. Aspidium.						
auriculatum, *Sw.*	...	...	...	...	...	...
var. lenta	...	...	1½′–2′	...	...	Rámganga river.
„ cæspitosa	...	...	1′	...	...	Sarju river ..
„ marginata	...	...	1½′–2′	...	...	Dwáli ...
sp.——	...	...	1′	...	...	Káthi ...
ilicifolium, *Don*	...	...	6″-9″	...	...	Mádhári Pass,
aculeatum, *Sw*	...	...	..	...	..	...
var. rufo-barbata	...	...	3′	...	...	Binsar ...
sp.——	...	...	6″–12″	...	...	Dwáli, Rálam, Tola.
Prescottianum, *Wall*,	...	...	1½′	...	...	Rálam, Milam,
aculeatum, *Sw.*	...	...	...	...	...	..
var. setosa	...	...	3′–4′	...	...	Káthi ...
angulare, *Willd.*?	...	...	3′	..	..	Naini Tál, Karim
var. ?——	...	...	2′	...	...	Kaphini ...
sp.——	...	...	2′	...	...	?
16. Nephrodium.						
parasiticum, *C. B. Clarke?*	...	...	...	...	...	?
var multijuga	...	...	2′–2½′	...	...	Karim ...
sp.——	...	...	...	...	...	?
sp.——	...	...	2′	...	...	?

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Forest	7—8,500	R.	...	...	= *Cyrtomium* in Herb. S. & W.
Banks	6,000	R.	...	...	named "*plebeium?*" and "*ruta, L.?*" in original, probably = *A. varians.*
Rocks	5–6,000	R.	...	...	
Do.	8,500	R	...	...	
Forest	7,000	R	...	...	= *Athyrium* No. 1 in Herb. S. & W.
Do.	7,000	R.	...	..	= *Athyrium* Nos. 2 & 4 in Herb. S. & W.
...	...	R.	...	..	= *Athyrium* No. 5 in Herb. S. & W.
Forest	6,000	R.	..	...	= *Athyrium* No. 3 do.
...	.	R	...	...	= *Diplazium* No 1 do.
Open	8,000	R.	..	...	= *Diplazium* No 2 do.
...	..	R.	...	...	= *Diplazium* No. 3 do.
Forest	7,800	R.	...	...	= *Diplazium* No. 4 do.
...	...	...	...	...	
Forest	9,600	R.	...	...	= *Polystichum* No. 1 in Herb. S. & W.
Rocks	4,500	R.	...	...	= Do. No. 2 do.
Forest	9,000	R.	...	...	= Do. No. 3 do.
Do.	7,000	R.	...	...	= Do. No. 4 do.
Do.	9,000	R.	...	...	= Do. No. 5 do.
...	...	...	...	...	= Do. No. 6 do.
Do.	6,5—7,500	R	..	..	= Do. No. 8 do.
Wet rocks	8—12,000	R.	D.	...	= Do. No. 9 do.
Open	11—12,000	R.	D.	...	= Do. No 10 do.
...	...	..	...	...	
Forest	7,700	R.	...	...	= Do. No. 7 do Not in Clarke's review of N. Indian Ferns.
Do.	6—7,000	R.	...	...	= Do. No. 11 in Herb. S. & W.
Open	10,000	R.	...	...	= *Nephrodium* No. 1 in Herb. S. & W.
...	?	R.	...	...	
...	...	R.	...	...	= *Lastrea* No. 2 in Herb. S. & W.
Open	6,500	R.	...	...	Do. No. 1 do.
...	...	R.	...	...	Do. No. 3 do.
...	...	R.	...	...	= Do. No. 4 do.

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
Filix-mas, *Rich.*	...	...	...	...	...	...
var. patentissima	...	...	2′—3′	...	...	Kálimundi, Dudutoli.
var.——	...	...	2′—3′	...	...	Milam
Brunonianum, *Hook.*,	...	...	1½′	...	...	Rálam
var.——	...	...	3′	...	...	Rálam, Sagtiadeo.
cochleatum, *Don*	...	...	2′—3′	...	...	Sarju valley, Dargara, Thal.
crenatum, *C. B. Clarke*,	...	...	2′—3′	...	...	Sarju valley
sp.——	...	...	...	...	...	?
sp.——	...	...	2′—3′	...	...	Kálimundi
sp.——	...	...	1½′	...	...	?
polymorphum, *Hk. & Baker.*	...	...	2′—3′	...	...	Rámganga river.
cicutarium, *Hk. and Baker.*	...	...	...	...	...	...
var. coadunata	...	...	3′	...	...	Sarju river
17. Nephrolepis.						
cordifolia, *Hk. and Baker.*	...	...	2′—2½′	...	...	Near Bágesar
18. Oleandra.						
Wallichii, *Presl.*	...	...	1½′—2′	...	...	Mohargári, Binsár.
19. Polypodium.						
erubescens, *Wall.*	1	...	3′	...	...	Rámganga river.
sp.——	2	...	1′—2′	...	...	?
sp.——	3	...	4″—6″	...	...	Kálimundi
sp.——	4	...	3′	...	...	?
argutum, *Wall.*	...	...	1′—2′	...	...	Binsar
sp.——	...	...	1′—1½	...	...	Jágesar
lachnopus, *Wall.*	...	...	1′—2′	...	...	Naini Tál, Mohargári.
amœnum, *Wall.*	...	...	1′—1½′	...	...	Káthi
proliferum, *Roxb.*	...	...	2′—3′	...	...	Bhábar, &c.
lineatum, *Colebr.*	...	...	2′—3′	...	...	Bágesar, Pharka?

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.* Rainy.	*Himálaya.* Dry.	Tibet.	Remarks.
...	...	...	...	...	
Forest ...	8,000	R.	...	...	=*Lastrea* No. 5 in Herb. S. & W.
Open ...	11,500	...	D.	...	= Do. No. 6 do.
Do. ...	12,000	R.	...	...	= Do. No. 7 do.
Do. ...	11—12,500	R.	...	...	= Do. No. 8 do.
Open banks and forest.	4—8,000	R.	...	...	= Do. Nos. 9 & 12 do.
Forest ...	3—4,000	R.	...	...	= Do. No 10 do.
...	...	R.	...	...	= Do. No. 11 do.
Forest ...	8,000	R.	...	...	.. Do. No. 13 do.
...	...	..	...	...	= Do. No. 14 do.
Forest ...	2,600	R.	...	..	=*Aspidium* in Herb. S. & W.
...	...	...	...	...	
Forest ...	3—4,500	R.	...	...	=*Sagenia* in Herb. S. & W.
Do. ...	3,000	R.	...	..	
Trees & banks,	6, 5—8,000	R.	...	...	
Forest ...	2,5—6,000	R.	...	...	
...	...	R.	...	...	
Forest ...	8,500	R.	...	...	name *P. pendulum* in Herb. S. & W
...	...	R.	...	...	named *P. angulosum* Lab. in Herb. S. & W.
Trees ...	7,000	R.	...	...	=*marginaria* No. 1 in Herb. S. & W.
Do. ...	6,000	R.	...	...	= Do. No. 2 do.
Forest ...	6—7,000	R.	...	...	= Do. No. 3 do.
Banks ...	7,500	R.	...	...	= Do. No. 4 do.
Forest ...	1—2,000	R.	...	...	=*Goniopteris* in Herb. S. & W.
Trees ...	3,5,—6,000	R.	...	...	=*Nephrodium* No. 2 in Herb. S. & W.

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
membranaceum, *Don*,	...	...	3'	...	...	Below Naini Tál.
hastatum, *Thunb.*	...	...	...	...	...	...
var. oxyloba	...	...	1'	...	...	Binsar
juglandifolium, *Don*,	...	...	2'—3'	...	...	Sarju river, Jágesar.
ebenipes, *Hook.*	...	...	1'—1½'	..	...	Binsar, Kálimundi.
sp.——	...	...	6"—9"	...	...	Binsar
sp.——	...	...	9"	..	..	Ditto.
sp.——	..	...	6"—8"	...	...	Do., Kálimundi,
propinquum, *Wall.*	...	...	1'—1½'	...	...	Binsar Rámári,
Wightianum, *Wall.*	...	...	9"—12"	...	...	Jagthana
lineare, *Thunb.*	...	...	1'—1½'	...	...	Naini Tál, &c.,
sp.——	...	.	4"	...	...	Pathar-kori,
Stewartii, *C. B. Clarke.*	...	...	1'—1½'	...	...	Binsar
sp.——	...	...	6"	...	...	Bágesar, Ják Pass
sp.——	...	...	1'	...	...	Ramári, Bágesar.
flocculosum, *Don*	...	...	1½'—2'	...	...	Bágesar
adnascens, *Sw.*	...	...	3"—4"	...	...	?
20. Gymnogramma.						
vestita, *Hook.*	...	...	9"	...	...	China
flavescens, *Presl.*	...	...	9"—12"	...	...	Suring
sp.——	...	...	9"	...	...	Mohargári
sp.——	...	...	3'	...	...	Rámganga river.
Totta, *Schlecht.*	...	...	1'	...	...	Jágesar
sp.——	...	...	6"	...	...	?
21. Meniscium.						
sp.——	...	...	1½'	...	...	Bágesar valley,
22. Vittaria.						
elongata, *Sw.*	...	...	1'—1½'	...	...	Káthi, Sarju valley.

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	Himálaya. Rainy.	Himálaya. Dry.	Tibet.	Remarks.
Trees ...	4—6,500	R.	...	...	=*Phymatodes* No. 1 in Herb. S. & W.
...	...	...	...	...	
Forest ...	6—7,000	R.	...	..	= ,, No. 2 do.
Do. ...	4,5—7,000	R.	...	...	= ,, No. 3 do.
On trees ...	7—9,000	R.	...	...	= ,, No. 4 do.
Do. ...	7,500	R.	...	...	= ,, No. 5 do.
Do. ...	7,500	R.	...	...	= ,, No. 6 do.
Do. ...	7—8,000	R.	...	...	= ,, No. 7 do.
Do. ...	4,5—7,000	R.	...	...	= ,, No. 8 do.
Do. ...	5,000	R.	...	...	= ,, No. 9 do.
Do. ...	6,5 - 8,000	R.	...	...	= ,, No. 10 do.
Open ...	10,500	R.	...	...	= ,, No. 11 do.
On trees ...	7,000	...	...	...	=*Pleopeltis* in Herb. S. & W.
Do. ...	3—6,000	R.	...	...	=*Niphobolus* No. 1 in Herb. S. & W.
Do. ...	3,5—6,500	R.		...	= ,, No. 2 do.
Do. ...	3,500	R.	...	...	= ,, No. 3 do.
...	...	R.	...	...	= ,, No. 4 do.
On rocks ...	7—8,000	R.	...	...	=*Notholæna* in Herb. S. & W.
Forest ...	4,000	R.	...	...	=*Loxogramme* No. 1 in Herb. S. & W.
Do. ...	4,000	R.	...	...	= ,, No. 2 do.
Do. ...	2,5—8,000	R.	..	...	named *G. caudata* in Herb. S. & W.
On rocks ...	...	...	...	...	=*Grammitis* No. 1 in Herb. S. & W.
...	?	R.	...	...	= ,, No. 2 do.
Forest ...	3,500	R.	...	...	
Trees ...	4,8—8,000	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
23. Osmunda.						
regalis, *L.* ...	1	...	2′	...	...	?
Claytoniana, *L.* ...	2	...	2′—3′	...	...	Above Námik, Rogila.
24. Lygodium.						
japonicum, *Sw.* ...	1 & 2	...	4′—5′	...	...	Bágesar, Bhábar.
25. Botrychium.						
virginianum, *Sw.* ...	1	...	2″—3″	...	...	Almora ...
Lunaria, *Sw.* ...	2	...	1′—1½′	...	...	Tola ...
CXXXI.—MARSILIACEÆ.						
1. Azolla.						
pinnata, *Ham.* ...	...	...	...	...	...	Satráli valley, Almora.
CXXXII.—LYCOPODIACEÆ.						
1. Psilotum.						
triquetrum, *Sw.* ...	...	...	6″	...	...	Gagás river ...
2. Lycopodium.						
Hamiltonii, *Spreng.* ...	1	...	9″—12″	...	...	Sarju & Ramganga valleys.
setaceum, *Ham.* ...	2½	...	9″—12″	...	...	Sarju valley, Jagthána.
var. subulifolia ...	2	...	9″—12″	...	...	Do.
clavatum, *L.* ...	3	...	3′—6′	...	...	Mádhári Pass, Dwáli.
3. Selaginella.						
caulescens, *Spring.* ...	4	...	6″	...	...	Near Bágesar...
sp.—— ...	5	...	2″	...	...	Deopryág ...
sp.—— ...	6	...	2″	...	...	Hinde river ...
radicata, *Spring.* ...	7	...	6″	...	...	Bágesar ...
integerrima, *Spring.* ...	8	...	6″	...	...	Naini Tál, Tapuban.
semicordata, *Wall.* ...	9	...	9″	...	...	Naini Tál ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.* Rainy.	*Himalaya.* Dry.	Tibet.	Remarks.
...	9,000?	R.	...	...	
Open ..	8—10,000	R.	...	...	
On bushes, scandent.	1—4,500	R.	...	...	
Open ..	5—7,000	R.	...	...	
Do. ...	12,000	R.	D.	...	
On water ...	1—5,500	R.	...	...	
...	...	...	...	...	
On trees ...	4—5,000	R.	...	...	
Do. ...	4—5,000	R.	...	...	
Do. ...	4—5,000	R.	...	...	
Woods & open...	8—10,000	R.	...	...	
Shady banks ...	3,000	R.	...	...	
River banks ...	2,500	R.	...	...	
On rocks ...	7,000	R.	...	...	
On banks ...	3,000	R.	...	...	
Open rocks ...	7—8,000	R.	...	...	
Damp woods ...	4—7,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
CXXXIII – EQUISETACEÆ.						
1. Equisetum.						
arvense, *L.* ...	1, 3	...	6″–18″	...	...	Pindari, Riukim.
palustre, *L.* ...	...	...	...	...	...	...
var.—— ...	2	...	6″–12″	...	...	Below Almora, Naini Tál.
debile, *Roxb.* ...	4, 5	...	4′	...	...	Bhábar, Naini Tál, Páton.
CXXXIV.—MUSCI.						
1. Braunia.						
sp.—— ...	1	...	...	...	...	Rúr pass ...
2. Anœctangium.						
æstivum ...	...	...	...	...	...	...
var. ?—— ...	2	...	...	...	...	Devi-dhura ...
var. ?—— ...	3	...	...	...	...	Dwáli ...
curvirostrum, *H.& T.*	4	...	...	...	...	Dwáli ? ...
var.—— ...	5	...	...	...	...	?
var.—— ...	6	...	...	...	...	Below Jalat ...
involutum, *Hook.* ...	7	...	...	...	...	?
4. Neissia.						
serratula, *Bry.* ...	8	...	...	...	...	Above Námik,
5. Rhabdoweissia.						
fugax, *Bry.* ...	9	...	...	...	...	Champwa ...
6. Symblepharis.						
sp.—— ...	10	...	...	...	...	Dwáli ...
7. Distichum.						
inclinatum, *Bry.* ..	11	...	...	...	...	Ráj-hoti ...
8. Desmatodon.						
Laureri, *Bry.* ...	12	...	...	...	...	?

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.* Rainy.	*Himálaya.* Dry.	Tibet.	Remarks.
Open, wet ...	11—13,500	R.	...	T.	
...	...	..	...	...	
Wet places ...	4–7,000	R.	...	...	
Open wet ...	1–6,000	R.	...	...	
Open ground ...	10,000	R.	...	...	
...	...	..	..	...	
Trees, &c., in forest.	7,000	R.	...	...	
...	8,500	R.	...	...	
...	8,500	R.	...	...	
?	?	R.	...	...	
...	5,000	R.	...	..	
?	?	R.	...	...	
...	9,000	R.	...	...	
...	9,000	R.	...	...	
...	9,000	...	...	...	
Open wet ground.	15,000	...	...	T.	=*Didymodon inclinatum*, Hk. & T.
?	?	R.	...	...	=*Tortula bryoides*, Hk.

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
9. Tortula.						
sp — ...	13	...	...	...	...	Dwáli ...
fallax, *Sw.* ...	...	...	...	...	...	...
var. — ...	14	...	...	...	...	Do. ..
unguiculata, *Hk. & T.*	15	...	...	...	...	?
10. Dicranum.						
sp. — ...	16	...	...	...	...	Champwa ..
11. Didymodon.						
cylindricus, *Bry.* ...	...	...	...	...	...	...
var. — ...	17	..	...	...	...	?
Tortula *Harv.* ? ..	18	...	...	...	...	Dwáli ...
12. Campylopus.						
sp. — ...	19	...	...	...	...	Devi-dhúra ...
13. Fissidens.						
bryoides, *Hedw.* ...	20	...	...	...	...	Devi-dhúra ...
taxifolius, *Hedw.* ...	...	...	...	...	...	...
var. — ...	21	...	...	...	...	Do ...
nobilis, *Griff.* ...	22	...	...	...	...	Pharka ..
14. Atrichum.						
crispum, *Wils.* ...	23	...	...	...	...	Bagdwár ...
15. Pogonatum.						
cirrhatum, *Sw.* ...	24	...	...	...	...	Sarju valley ...
urnigerum, *Bry.* ...	...	...	...	...	...	...
var. crassum ..	25	...	...	...	...	Bagdwár, Sarju valley.
microstomum, *Hook.*,	26	...	...	...	...	Dwáli ...
16. Eucalypta.						
sp. — ...	27	...	...	...	...	? ...
17. Orthodon.						
serratus, *Schw.* ...	28	...	...	...	...	? ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himalaya.* Rainy.	*Himalaya.* Dry.	Tibet.	Remarks.
Banks & trees,	9,000	R.	..	...	
...	...	..	...	...	
...	8,500	R.	...	...	
?	?	R.	...	...	
...	9,000	R.	...	...	
...	?	R.	...	...	
?	...	...	...	...	
Banks & trees.	9,000	R.	...	...	= *Weissia tenuirostris*, Hk. and T.
Banks ...	7,000	R.	...	...	
...	7,000	R.	•	...	
...	...	...	...	...	
...	7,000	R.	...	...	
...	6,500	R.	...	...	
...	8,000	R.	...	...	= *Polytrichum*, Hook. & T.
...	3,500	R.	...	...	
...	...	...	...	...	
...	3,5—9,000	R.	...	...	
...	8,000	R.	...	...	
...	?	R.	...	...	
...	?	R.	...	...	= *Octoblepharum serratum*,

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
18. Dissodon.						
sp.—— ...	29	...	...	...	...	Champwa ...
19. Ptychomitrium.						
polyphyllum, *Bry.* ...	30	...	...	...	...	Dwáli ...
20. Schistidium.						
apocarpum, *Bry.* ...	...	...	...	...	...	... ...
var.—— ...	31	...	...	...	...	Do.
21. Racomitrium.						
sp.—— ...	32	...	...	...	...	Káthi ...
22. Mielichhoferia.						
sp.—— ...	33	...	...	...	...	Pindari ...
23. Brachymenium.						
nepalense, *Hook.* ...	...	...	...	...	...	...
var.—— ...	34	...	...	...	...	Dwáli ...
24. Bryum.						
elongatum, *Hk. & T.*,	35	...	...	...	...	Do. ...
sp.—— ...	36	...	...	...	...	? ...
sp.—— ...	37	...	...	...	...	Jágesar ...
sp.—— ...	38	...	...	...	...	Do. ...
Diwalii ? *Bry.* ...	39	...	...	...	...	Bagdwár ...
turbinatum ? *Bry.* ...	40	...	...	...	...	? ...
latifolium ? *Bry.* ...	41	...	...	...	...	? ...
sp.—— ...	42	...	...	...	...	Barjikáng Pass.
versicolor, *Bry.* ...	...	...	...	...	...	...
var.—— ...	43	...	...	...	...	Síba ...
giganteum, *Hook.* ...	44	...	...	...	...	Near Káthi ...
sp.—— ...	45	...	...	...	...	Jágesar ...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the area.	*Himá-laya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Banks & trees,	9,000	R.	...	...	
...	9,000	R.	...	...	= *Trichostomum polphyllum*, Hk. and T.
		R.	...	...	
...	9,000	...	...	...	= *Grimmia*, Hk. and T.
...	7,500	R.	...	...	= *Trichostomum*, Hook. and T.
pen ground,	11,000	R.	...	..	
...	...	..	...	...	
...	9,000	R.	...	...	
...	8,500	R.	...	...	
...	?	R.	...	...	
Banks ...	7,500	R.	...	...	
...	7,500	R.	...	...	
...	9,000	R	...	...	
Open ground ...	14,000	...	...	T.	
Do. ...	15,000	...	.	T.	
Do. ...	14,500	R.	...	...	
...	...	...	...	...	
Wet banks and rocks.	9,000	R.	...	...	
Banks & trees.	8,000	R.	...	...	
...	7,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
25. Mnium.						
rhyncophorum, *Harv.*,	46	...	...	...	...	Káthi
sp.——	47	...	...	...	...	?
sp.——	48	...	...	...	...	Káthi, Jalat,
26. Funaria.						
hygrometrica, *Hedw.*	...	...	...	...	...	...
var.——	49	...	...	...	...	Kapkot
var.——	50	...	...	...	...	Jágesar
27. Orthotrichum.						
sp.——	51	...	...	...	...	Dwáli
28. Bartramea.						
patens, *Schw.*	...	...	...	...	...	...
var.——	52	...	...	...	...	Champwa
sp. ——	53	...	...	...	...	Do
falcata, *Hook.*	54	...	...	...	...	Kálimundi
var.——	55	...	...	...	...	Gágar Pass
29. Leucodon.						
sp.——	56	...	...	...	...	Dwáli, near Jalat.
30. Leptodon.						
sp.——	57	...	...	...	...	Jagesar
31. Pterogonium.						
cœspitosum, *Wils.*	58	...	...	...	...	Bagdwár
32. Neckera.						
sp.——	59	...	...	...	...	Sarju valley
squarrosa, *Hook.*	60	...	...	...	...	Jalat
crispatula, *Hook.*	61	...	...	...	...	Above Jalat
pennata, *Hedw.*	62	...	...	...	...	?
dendroides, *Hook.*	...	...	...	...	...	...
var.——	63	...	...	...	...	Káthi
sp.——	64	...	...	...	...	Do.
acuminata? *Hook.*	65	...	...	...	...	?
blanda? *Harv.*	66	...	...	...	...	Bágesar valley,
Griffithiana, *Schw.*	67	...	...	...	...	Dwáli
Julacea, *Harv.*	68	...	...	...	...	Jágesar

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.* Rainy.	*Himálaya.* Dry.	Tibet.	Remarks.
...	7,000	R.	...	...	
?	?	R.	...	...	
...	7,000	R.	...	...	
...	...	...	...	...	
Banks ...	3,500	R	...	...	
...	6,000	R.	...	...	
Trees ...	9,000	R.	...	...	
...	...	...	...	...	
Banks & trees,	9,000	R.	...	...	
...	9,000	R	...	...	
...	8,000	R.	...	...	
Banks wet ...	7,000	R.	...	...	
Banks & trees,	5—8,500	R.	...	...	= *Sclerodontium secundum*, Harv.
...	6,000	R.	...	...	
...	9,000	R.	...	..	
Banks ...	3,500	R.	...	...	
...	5,000	R.	...	...	
...	7,500	R.	...	...	
...	?	R.	...	...	
...	...	...	...	...	
...	6,800	R.	...	...	
...	7,000	R.	...	...	
...	?	R.	...	...	
...	3,500	R.	...	...	
...	8,500	R.	...	...	= *N. aurea*, Griff.
...	6,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
33. Cylindrothecium.						
sp.——	69	...	...	...	...	Bágesar valley,
34. Anmodon ?						
sp.——	70	...	...	...	...	Káthi
sp.——	71	...	...	...	...	?
35. Pilotrichum						
sp.——	72	...	...	...	...	?
36. Isothecium.						
sp.——	73	...	...	...	...	?
37. Pylaisaea.						
polyanthos, *Bry.*	...	...	...	...	...	...
var.——	74	...	...	...	...	Jágesar
38. Hypnum.						
sp.——	75	...	...	...	...	Sarju valley
sp.——	76	...	...	...	...	Do.
confertum, *Dicks.*	...	...	...	...	...	...
var. —	77	...	...	...	...	?
plumosum ? *Hook.*	78	...	...	...	...	Káthi
var.——	79	...	...	...	...	Mádhári Pass,
sp.——	80	...	...	...	...	Káthi
sp.——	81	...	...	...	...	Do.
salebrosum, *Hedw.*	82	...	...	...	...	Do.
sp ——	83	...	...	...	...	Sarju valley & Káthi.
sp.——	84	...	...	...	...	Sámkhet
fluviatile, *Sw.*	..	...	...	...	...	...
var.——	85	...	...	...	...	Sába
Wallichii, *Hook.*	86	...	...	...	...	Pharka
sp.——	87	...	...	...	...	Sarju valley
sp.——	88	...	...	...	...	Dwáli
sp.——	89	...	...	...	...	Sarju valley
macrocarpum, *Schw*,	...	..	...	...	...	...
var ?——	90	...	...	...	...	Námik & Jalat,
proliferum, *L.*	91	...	...	...	...	Káthi, Naini Tál.
recognitum, *Hedw.*	92	...	...	...	...	Káthi

Plants—(continued).

Conditions of soils &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
...	3,500	R.	...	...	= *Neckera myura*, Hook.
Banks & trees,	7,000	R.	...	...	
?	?	R.	...	...	= *Neckera minor* ? Hedw.
?	?	R.	...	...	
?	?	R.	...	...	
...	...	R.	...	...	
...	6,000	R.	...	...	= *Leskea polyanthos*, Hook. and T.
Banks ...	3,500	R.	...	...	= *Leskea* sp ?
...	3,500	R.	...	...	= *Leskea acuminata* ? Hedw.
...	.	...	..	...	
Banks & trees,	?	R.	...	...	
...	7,000	R.	...	...	
...	8,000	R.	...	...	
...	7,000	R.	...	...	
...	7,000	R.	..	...	
...	7,000	R.	...	...	
...	3,5—7,000	R.	...	...	
In water ...	5,500	R.	...	...	
...	...	...	...	..	
Wet banks ..	9,000	R.	...	...	
Do. ...	6,500	R.	...	...	
Banks ...	3,500	R.	...	...	
Banks & trees,	8,500	R.	...	...	
...	3,500	R.	...	...	
...	...	...	...	...	
...	7—9,000	R.	...	...	= *H. Strongylum*, Taylor.
...	6,500	R.	...	...	
...	6,500	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
commutatum, *Hedw.*,	...	...	...	...	...	...
var. ? ——	93	...	...	...	...	Ráj-hoti
Palustre, *L*	...	...	...	...	...	Bagdwár
var, subsphærocarpum.	94	...	...	...	...	...
sp. ——	95	...	...	...	...	Sarju valley
sp.——	96	...	...	...	...	?
filicinum, *L.*	97	...	...	...	...	Gágar Pass
39. Leptohymenium.						
microphyllum, *Schw.*,	98	...	...	...	...	Káthi
tenue, *Schw.*	99	...	...	...	...	?
40. Dicranodontium.						
longirostrum, *Bry.*	100	...	...	...	...	?
41. Hookeria.						
sp ——	101	...	...	...	...	Dwáli
42. Hypopterygium.						
sp.——	102	...	...	...	...	Pharka
HEPATICÆ.						
1. Riccia.						
sp.——	1	...	...	...	...	Sámkhet
sp.——	2	...	...	...	...	Do.
sp.——	3	...	...	...	...	Do.
2. Marchantia.						
sp.——	1	...	...	...	...	?
sp.——	2	...	...	...	...	?
sp.——	3	...	...	...	...	Near Jalat
sp.——	4	...	...	...	...	Do.
sp.——	5	...	...	...	...	Sarju river
sp ——	6	...	...	...	...	?
sp. ——	7	...	...	...	...	Sarju river
sp.——	8	...	...	...	...	Máson
sp. ——	9	...	...	...	...	Sarju river

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.* Rainy.	*Himálaya.* Dry.	Tibet.	Remarks.
...	...	...	...	...	
Open wet ground.	15.000	R.	..	...	
...	...	...	...	...	
...	9,000	R.	...	...	
Banks ...	4,000	R.	...	...	
...	?	R.	...	...	
Wet banks ...	7,000	R	...	...	
Banks & trees,	7,000	R.	...	...	
...	?	R	...	...	= *Neckera tenuis*, Hook.
...	?	R.	...	...	= *Didymodon*, Schw.
...	8,500	R.	...	...	
...	6,500	R.	...	...	= *Hypnum laricinum*, Hook. var?
In water ...	6,000	R.	...	...	
Do. ...	6,000	R.	.	..	
Do. ...	6,000	R.	...	...	
? ...	?	R.	...	...	
? ...	?	R.	...	...	
Damp earth ...	5,000	R.	...	...	
Do. ...	5 000	R.	...	...	
Do. ...	3,000	R.	...	...	
? ...	?	R.	...	...	
Do. ...	3,300	R.	...	...	
Do. ...	5,000	R.	...	...	
Do. ...	8,500	R.	...	...	

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
3. Jungermannia.						
sp.—— ...	1	...	...	...	...	Champwa ...
sp.—— ...	2	...	...	...	...	Námik ..
sp.—— ...	3	...	...	...	...	Dwáli ...
sp.—— ...	4	...	..	...	...	Do. ..
sp.—— ...	5	...	...	...	...	Do. ...
sp.—— ...	6	...	...	...	...	Do. ...
CHARACEÆ.						
1. Chara.						
verticillata ...	...	...	..	...	...	Sariya Tál, &c.,
2. Nitella.						
sp.—— ...	..	...	..	...	...	Naini Tál ...
LICHENES						
1. Collema.						
saturninum, *Ach.* ...	1	...	...	...	...	Mádhári Pass,
nigrescens, *Ach.* ...	2	...	...	...	...	China ...
tremelluides, *Ach.* ...	3	...	...	...	...	Do. ...
2. Umbilicaria.						
depressa, *Schrad.* ...	...	...	...	...	...	Pindari ...
3. Lecidea.						
glacialis ? *Fries.* ...	1	...	...	...	.	Shelong ...
geographica, *Ach.* ...	2	...	...	...	...	Malchak Pass,
armeniaca, *Ach* ..	3	...	...	...	...	Shelong ...
sabuletorum, *Fries.* ...	...	...	...	...	...	...
var. coniops ...	4	...	...	...	...	Do. ...
4. Biatora.						
himalayana, *Bab.* ...	...	...	...	...	...	Gori river ...
5. Cladonia.						
pyxidata, *Fries.* ...	1	...	...	...	...	Pindari
vermicularis, *Ach.* ...	...	...	...	...	...	...
var. taurica ...	2	...	...	...	...	Bomprás
perfoliata ...	3	...	...	...	...	...

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
Open ...	10,000	R.	...	...	
Banks in forest,	8,000	R.	...	...	
Do. ...	8,500	R.	...	...	
Do. ...	8,500	R.	...	...	
Do. ...	8 500	R.	...	...	
Do. ...	8,500	R.	...	...	
In water ...	5—6,000	R.	...	...	
...	6,500	R.	...	...	
On trees ...	8,200	R.	...	...	
...	8,700	R.	...	...	
...	8,700	R.	...	...	
Earth ..	12,000	R.	...	...	
Rocks ...	13,000	...	D.	...	
...	16,000	...	D.	...	
...	13,000	...	D.	...	
...	...	...	...	...	
...	13,000	...	D.	...	
...	4,700	R.	...	...	
...	12,000	R.	...	...	
...	...	...	...	...	
...	16,000	...	D.	...	
...	...	...	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
6. Stereocaulon.						
tomentosum, ***Fries.***	1	...	...	...	...	Gori river
corallinum, ***Schr.***	2	...	...	...	...	Pindari
ramulosum, ***Ach.***	...	...	...	...	...	...
var. strictum.	3	...	...	...	...	Sagtia-Deo Pass, Mádhári Pass.
7. Urceolaria.						
calcarea	...	...	...	...	...	Shelong
8. Parmelia						
melanasnia, ***Wahl.***	1	...	...	...	...	Shelong
pulverulenta, ***Ach.***	...	...	...	...	...	...
var.——	2	...	...	..	...	Gori river
elegans, ***Ach.***	3	...	...	...	...	Shelong
oreina, ***Ach.***	4	...	...	...	...	Do.
vitellina ? ***Ach.***	5	...	...	...	...	Do.
calcarea ? ***Fries.***	6	...	...	...	...	Do.
scruposa ? ***Ach.***	7	...	...	...	...	Do.
chrysoleuca, ***Ach.***	8	...	...	...	...	Do.
saxicola, ***Ach.***	9	...	...	...	...	Do.
cœsia, ***Ach.***	10	...	...	...	...	Do.
stellaris, ***Ach.***	11	...	...	...	...	Do.
speciosa, ***Ach.***	12	...	..	...	...	Gori river, Chína.
lævigata, ***Ach.***	13	...	...	...	...	Chína
perlata, ***Ach.***	15	...	...	...	...	Karim Pass
var. saccatiloba	14	...	...	...	...	Chína
perforata, ***Ach.***	16	...	...	...	...	Do.
tiliacea, ***Ach.***	17	...	...	...	...	Do.
scortea, ***Ach.***	18	...	...	...	...	Mádhári Pass,
caperata, ***Ach.***	19	...	...	...	...	Chína
leucomela, ***Ach.***	20	...	...	...	...	Do.
cirrhata, ***Fries.***	21	...	...	...	...	Do.
9. Sticta.						
pulmonacea, ***Ach.***	...	...	...	...	...	...
var. hypomela	1	...	...	...	...	Chína
retigera, ***Ach.***	2	...	...	...	...	Dúgli
herbacea, ***Del.***	3	...	...	...	...	Karim and Káthi Passes, Chína.
10. Pettidea.						
horizontalis, ***Ach.***	1	...	...	...	...	Above Dwáli...
canina, ***Ach.***	2	...	...	...	...	Chínar Dwáli,

Plants—(continued).

Conditions of soil, &c.	Elevation in feet above the sea.	*Himálaya.*		Tibet.	Remarks.
		Rainy.	Dry.		
...	4,700	R.	...	...	
Earth ...	12,000	R.	...	...	
...	...	.	...	...	
Rocks ...	8—11,500	R.	...	...	
...	13,000	...	D.	...	
...	13,000	...	D.	...	
...		..	...	...	
...	4,700	R.	...	...	
...	13,000	..	D.	...	
...	13,000	..	D.	...	
...	13,000	..	D.	...	
...	13,000	...	D.	...	
...	13,000	...	D.	...	
...	13,000	...	D.	...	
...	13,000	...	D.	...	
...	13,000	...	D.	...	
...	13,000	...	D.	...	
Rocks and trees,	4, 7—8,700	R.	...	...	
On trees ..	8,700	R.	...	...	
...	7,500	R.	...	...	
On trees ...	8,700	R.	...	...	
...	8,700	R.	...	...	
...	8,700	R.	...	...	
...	8,200	R.	...	...	
...	8,700	R.	...	...	
...	8,700	R.	...	..	
...	8,700	R.	...	...	
...	...	...	...	...	
...	8,700	R.	...	...	
...	10,500	R.	...	...	
...	7, 5—9,000	R.	...	...	
...	9,000	R.	...	...	
...	8—9,000	R.	...	...	

List of Kumaon

Name.	Herbarium number (Strachey and Winterbottom).	Habit of growth.	Height of plant.	Colour of flower.	Time of flowering.	Locality.
11. Solorina.						
saccata, *Ach.* ...	...	...	...	...	...	Káthi Pass ...
12. Cetraria.						
Stracheyi, *Bab.* ...	1	...	...	...	...	Near Káthi ..
ambigua, *Bab.* ..	2	...	...	...	...	Bomprás ...
13. Ramalina.						
farinacea ? *Ach.* ...	...	...	...	...	...	Pindari ...
14 Evernia.						
Stracheyi, *Bab.* ...	...	...	...	...	...	Pindari, Bomprás.
15. Usnea.						
himalayana, *Bab.* ...	1	...	...	...	...	Binsar ...
longissima, *Ach.* ...	2	...	...	...	...	China ...
ceratina, *Ach.* ...	3	...	...	...	...	Do. ...
sp.?—— ...	...	...	...	...	...	Do. ...
sp.?—— ...	...	...	...	...	...	Hot valleys ...

NOTE.—The whole of this chapter has been edited and prepared by Mr. F. nished by General R. Strachey. My work has been confined to seeing that the proofs.—E. T. A.

Plants—(concluded).

Conditions of soil, &c.	Elevation in feet above the sea.	Himá-laya.		Tibet.	Remarks.
		Rainy.	Dry.		
...	8,000	R.	...	...	
...	7,200	R.	...	...	
Stones ...	16,000	...	D.	...	
Do. ...	11,500	R.	...	...	
Do. ...	11, 5—16,000	R.	D.	...	
Trees ...	7,000	R.	...	...	
...	8,700	R.	...	...	
...	8,700	R.	...	...	
...	8,700	R.	...	...	
On oberonia ...	2,000	R.	...	...	

Duthie, Superintendent of the Botanical Gardens, Saháranpur, from the list fur-
corrections made in the first proofs by Mr. Duthie were carried out in the second

CHAPTER IX.

ECONOMIC BOTANY.

CONTENTS.

Arrangement of the subject. Food of the people. Analysis of the food-grains. Watson's formula. Cultivated food-grains. Cereals. Pulses. Amaranths. Polygonaceæ. Cultivated vegetables. Gourds. Vegetables. Condiments and spices. Greens. Fruits, cultivated and wild. Uncultivated products used as food. Drugs. Narcotics and spirits. Oil-seeds. Dyes and tans. Gums and Gum-resins. Fibres. Woods.

Arrangement of the subject.

THE economic botany of the Himálayan districts of these provinces, actual and potential, opens out such a wide field for investigation that it would be impossible to do more than review the information that we possess. The materials are to be found scattered over numerous memoirs, articles, reports, and notes, and are as practically inaccessible to the general public as if they had never been collected. The form of this chapter will, therefore, be more that of a suggestive classified list than of a treatise, which would, in the first place, be more than could be usefully prepared by one person; and, in the second place, will come more fitly into the general review of the economic products that is about to be undertaken by the Department of Agriculture in these provinces.[1] For the more orderly arrangement of our subject, we shall divide the useful products of the vegetable kingdom into the following classes:--

I.—Vegetable substances used as food by men and animals.

- *a.* Cultivated food-grains.
- *b.* Cultivated vegetables.
- *c.* Spices and condiments.
- *d.* Greens.
- *e.* Fruits, cultivated and wild.
- *f.* Uncultivated products used as food.

II.—Vegetable substances used in pharmacy.

- *a.* Drugs.
- *b.* Narcotics and spirits.

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[1] Progress has been made in this direction by the publication of my "Notes on the Economic Products of the North-Western Provinces." Part I., on 'Gums and gum-resins;' Part II., on 'Economic Mineralogy;' Part III., issued by the Department of Agriculture, contains, 'Tans and Dyes;' Part IV., 'Cultivated food-grains'; Part V., 'Gourds: vegetables: condiments and uncultivated products used as food.' The remainder are under preparation and will comprise 'Drugs,' 'Fibres,' 'Woods, and 'Narcotics.'

III.—Vegetable substances used in manufactures.

- *a.* Oil-seeds.
- *b.* Tans and dyes.
- *c.* Gums and gum-resins.
- *d.* Fibres.
- *e.* Woods.

IV.—Special subjects.

- *a.* Forest history.
- *b.* Tea cultivation.
- *c.* Rhea experiments.
- *d.* Sericulture.
- *e.* Miscellaneous.

I.—VEGETABLE SUBSTANCES USED AS FOOD BY MEN AND ANIMALS.

Food of the people.

The population of the Himálayan districts is essentially Hindu, and consequently the vegetable kingdom affords most of the substances used as food by the people. Few of the hill-men, even amongst those who have had much communication with the plains, have any prejudice in regard to eating animal food. The majority partake of the flesh of kids, short-tailed sheep, and young male buffaloes at festivals and marriages, and whenever sacrifices are offered to the consort of Siva. With but few exceptions all eat the flesh of deer, pheasants, and partridges, but not of jungle fowl; whilst in Garhwál, all, including Brahmans, eat the flesh of the wild pig. The servile classes (Doms, &c.) eat meat of all kinds whenever they can get it, even of animals killed by wild beasts or which have died from disease, and in their habits differ little from the Chamárs of the plains. Uncultivated products are used as food chiefly by the inhabitants of the jungly tract lying along the foot of the hills and along the banks of the Káli, and, in times of scarcity, by the people of the upper Pattis. At all times, however, the young leaves of nettles, of several species of ferns, sorrel, and the like, are used as a spinach by all classes. An examination of the list of cultivated products use das food will show that the greater portionbelong to the great natural orders *Gramineæ* or grasses, *Leguminosæ* or pulses, and *Cucurbitaceæ* or gourds. The two former afford life-supporting substances abounding in albuminous matters and those capable of repairing tissues accompanied with starch, gum, and sugar in such proportion as to support respiration and promote animal heat. They also provide the inorganic substances necessary to keep the circulation in a healthy state and to renew the solid frame-work of our bodies. Of these two orders the *Gramineæ* or grasses is the more important, containing as it does wheat, barley, rice, millets, maize, and sugarcane, which enter so largely into the food-resources not only of this country but of every country in the universe. To the *Leguminosæ* belong peas, beans, lentils, and gram. The gourds and cultivated vegetables are eaten more as a relish or to eke out a scanty supply of food-grain than as a sole food resource, and then only at certain seasons when their abundance and cheapness render them a favourite. The same may be said of fruits, cultivated and wild, and of the wild plants collected for food.

Analysis of the food-grains.

There are three forms of nitrogenous substances common to both animal and vegetable organizations distinguished by the names albumen, fibrine, and caseine; and it has been found that, when introduced into a living organism, each of these is capable of being converted into the other.[1] The principal ingredients of the blood of animals is found to be fibrine and albumen, and these substances contain, besides the carbon, hydrogen, and oxygen found in farinaceous products, such as the cereals, nitrogen, sulphur, and phosphorus, which abound in the pulses. These elements are also found in all parts of the animal organism except water and fat. It follows, therefore, that nutritious food must possess both albuminous and nitrogenous ingredients. The former are composed of carbon, hydrogen, and oxygen; the hydrogen and oxygen being in proportion to form water, thus leaving the carbon wholly unoxidised; or if we suppose the oxygen to be divided between the carbon and hydrogen, a surplus of carbon and hydrogen that is unoxidised remains. We are now speaking of what takes place after the food has been taken into the body and there submitted to assimilation. From the moment an animal is born until it dies oxygen is taken into its body through the skin and lungs, and given out again by the same channels in the form of compounds of carbon and hydrogen, or, in other words, as the vapour of water and carbonic acid. The latter is derived from the food eaten; for, when an animal is unable to take food, so long as it lives, it continues to inspire oxygen and give out compounds of carbon and hydrogen, which it obtains from the waste of the tissues of its own body. In fact death ensues from the action of the inspired oxygen, on account of its powerful affinity for carbon and hydrogen. When the animal has no longer superfluous carbon and hydrogen capable of combining with oxygen, it seizes on the carbon and hydrogen of the animal's own body; and, in the first instance, on the fat, which is almost all carbon and hydrogen, in order to satisfy the oxygen absorbed in the circulation, which afterwards goes off as carbonic acid in water. From the above it will be seen that food containing a surplus of carbon and hydrogen is necessary to an animal in order to support respiration without destroying its structure. But, besides defending the animal tissues and other parts from the action of oxygen, food maintains animal heat; for, whenever oxygen combines with a combustible, heat is developed; and that this does not depend on outward influences is shown by the fact that the heat of the body is the same in the tropics and in cold countries.

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[1] Based on the researches of Professor Mayer.

There are thus two great uses to which food is adapted by its composition—the nitrogenous to renew the blood and the non-nitrogenous to support respiration and maintain animal heat. But besides these there are other ingredients in food, the salts, such as iron, phosphate of lime, chloride of sodium with other salts of sodium, potash and magnesia, which occur also in the blood and bones, nails and hair. The following analyses of the principal cultivated food-grains are intended to show separately the quantity of these three principal ingredients present in each class of grain, and in doing so its comparative value as a food resource. A study of the tables will corroborate in most cases the empirical verdict on the value of each grain formed by the natives of these provinces, and give a scientific basis to their estimates, which would otherwise appear to be based on arbitrary data arising from their habits of life. The first series refer to the cereals, the second to the pulses, and the third to other vegetable products. We shall first, however, give Liebig's analysis of the three forms of nitrogenous substances found in animal and vegetable organisms for comparative purposes, and then Professor Mayer's ultimate analysis of the various food-grains.

Analysis of

	Albumen.	Caseine.	Fibrine.
Sulphur	1·30	0·9	1·0
Carbon	53·30	43·6	53·2
Nitrogen	15·30	15·8	17·2
Hydrogen	7·16	7·1	6·9
Oxygen	22·34	22·6	21·7
	100·00	100·00	100·00

Results of analysis A.

These are arranged in percentages so as to show the composition of the different substances existing in each vegetable product examined with their separate uses as life-sustaining compounds.

Names of products.	Nitrogenous ingredients.	Non-nitrogenous ingredients.	Inorganic ingredients.
CEREALS.			
Triticum vulgare, wheat, *gehún*, B.	14·45	83·15	2·40
Ditto, H.	19·15	79·77	0·70
Hordeum hexastichon, barley, *jao*, H.	14·72	84·80	2·84
Oryza sativa, rice, *dhán*, M.	9·08	83·08	0·47
Ditto, H.	7·40	91·60	0·36
Zea Mays, maize, *makai*, H.	14·66	84·52	1·92
Rye, B.	10·70	87·00	2·30
Do., H.	11·92	85·65	1·33
Penicillaria spicata, millet, *bájra*, M.	13·92	83 27	0·73
Eleusine Corocana, *mandua*, M.	18·12	80·25	1·03
Avena sativa, oats, *jai*, B.	13·93	82·07	4·00
Ditto, H.	15·24	86·05	3·26
Sorghum vulgare, *joár*, M.	15·53	83·67	1·26
PULSES.			
Ervum Lens, lentils, *masúr*, H.	30·46	65·06	2·60
Pisum sativum, peas, *mattar*, B.	26·52	70·38	3·10
Ditto, H.	28·02	67·31	3·18
Phaseolus vulgaris, bean, *sem*, H.	28·64	66·70	4·38
OTHER VEGETABLE PRODUCTS.			
Solanum tuberosum, potato, *álu*, B.	9·[illegible]	86·50	4·00
Ditto, H.	9·96	86·36	3·61
Brassica Rapa, turnip, *shalgam*, B.	10·70	81·70	7·60
Ditto, H.	12·62	81·33	7·02
Beta vulgaris, beet, *chaukandar*, B.	10·70	83·00	5·30
Ditto, H.	15·50	73·18	6 43
Daucus Carota, carrot, *gájar*, H.	10·66	84·59	5·77
Brassica Napus, colza, H.	9·24	90·32	4·01

In the above table M. denotes an analysis by Professor Mayer; B. by M. Boussingault in his 'Économie Rurale;' and H. by Mr. Horsford in L. E. D., Phil. Mag., November, 1846, p. 365.

Results of analysis B.

Here the arrangement is in percentages so as to show the ultimate composition of each product examined, without reference to the different compounds existing in them or their uses as life-sustaining compounds :—

Names of products.	Carbon.	Hydrogen.	Oxygen.	Nitrogen.	Ash.
CEREALS.					
Triticum vulgare, wheat, B.	46·10	5·10	43 50	·2.30	2·40
Ditto, H.	45 69	6·76	43 23	3·00	0·70
Hordeum hexastichon, barley, H.	45·50	6 89	44.68	2 34	2·84
Oryza sativa, rice, M.	44·87	5·83	46·10	1·43	0·47
Ditto, H.	44·61	6·53	46·62	1·16	0·36
Zea Mays, maize, H.	45·01	6 60	44·62	2 14	0·86
Rye, B.	46·20	5 60	44·20	1.70	2·30
Do., H	44·37	6 65	44 55	1 87	1·33
Penicillaria spicata, bájra, M.	44·48	6 43	44·09	2·19	0 73
Eleusine Corocana, ***mandua***, M.	48·64	6·10	43·77	2·86	1·03
Avena sativa, oats, B.	50 70	6·10	36 70	2·20	4·00
Ditto, H.	46·50	6 64	45·59	2 39	3 26
Sorghum vulgare, ***joár***, M.	45·69	6·24	44·82	2 45	1·26
PULSES.					
Ervum Lens, lentils, H.	45·35	6·75	38·50	4·77	2·60
Pisum sativum, peas, B.	46·50	6·20	40 00	4·20	3·20
Ditto, H.	45·12	6·73	38.92	4·42	3·18
Phaseolus vulgaris, beans, H.	43·07	6·63	39 03	4·47	4·38
OTHER VEGETABLE PRODUCTS.					
Solanum tuberosum, potato, B.	44·00	5·80	44·70	1·50	4·00
Ditto, H.	43·86	6·00	44·79	1·56	3·61
Brassica Rapa, turnip, B.	42·90	5·50	42·30	1·70	7·60
Ditto, H.	43·19	5·68	42·96	1·98	7·02
Beta vulgaris, beet, B.	42·80	5·80	43·40	1·70	6·30
Ditto, H	40·99	5·72	39·37	2·43	6·43
Daucus Carota, carrot, H.	43·34	6 22	43·90	1·67	5·77
Brassica Napus, colza, H.	45·32	6·01	46·68	1·43	4·01

The results of the preceding tables are supported by a further examination of the pulses grown in these provinces. The following table gives the average result of an analysis of several samples of each product taken from 'Panjab Products,' I., 243 :—

Names of products.	Nitrogenous ingredients.		Carbonaceous or starchy. ingredients.		Fatty or oily matter.	
	In 100 parts : varies in specimens from different parts of India.					
Cicer arietinum, gram, *channa*	18·05	21·23	60·11	63·62	4·11	4·93
Ervum Lens, lentils, *masúr*	24·57	26·18	59·34	59·96	1·00	1·92
Lathyrus sativus, *kisári* (Calcutta specimen).	31·50	...	54·26	...	0·95	...
Pisum sativum, peas, *mattar*	21·80	25·20	58·38	62·19	1·10	1·12
Phaseolus aconitifolius, *moth* (Calcutta specimen).	23·80	...	60·78	...	0·64	...
Phaseolus Mungo, *múng*	23·34	24·70	59·38	60·36	1·11	1·48
P. var. *radiatus*, *urd* (Bombay specimen).	22·48	...	62·15	...	1·46	...
Vigna Catjang, *lobiya* (Bombay specimen).	24·00	...	59·02	...	1·41	...
Dolichos biflorus, *gahat*	23·03	23·47	61·02	61·85	0·76	0·87
,, *Lablab*, *shími*	22·45	24·55	60·52	60·81	0·81	2·15
Cajanus indicus, *arhar*	19·83	20·38	61·90	64·32	1·32	1·86
Glycine Soja, *bhat*	37·74	41·54	29·51	31·08	12·31	18·90
Cyamopsis psoralioides, *gawár* (Púna specimen).	29·80	...	53·89	...	1·40	...

From an inspection of the preceding tables it will be seen that the pulses abound in nitrogenous elements so efficient in repairing the tissues, and next to them the cereals. A comparison with the analysis of the constituents of the blood will show that the composition of both is almost identical, and will also explain why experience has taught the natives of these provinces to mix together in their food, in certain proportions, cereals and pulses, the one supplying what the other is wanting in. Thus the flour of gram and peas is mixed with that of the cereals and especially with millet flour. Pulse bread is very seldom eaten alone, and then only locally and for some special reason.

The millets and the coarser pulses form the staple food of the hill population. Amongst the former the *mandua*, *janghora*, *koni*, *chína*, and *mána*, and amongst the latter the *gahat*, *bhat*, and *rains*. The *mandwa* is either made into bread or into a porridge called *bári*, and the *chína* and *koni* are also made into bread or boiled whole and eaten as rice. When travelling, the lower classes live chiefly on *satu*, the meal of parched barley, which only requires the addition of a little water to prepare it for eating. The following remarks of Traill still hold good :—

"Rice forms the favourite food of all those who can afford to purchase it. Wheat is only in partial consumption, chiefly on occasions of entertainments at marriages, &c., when the peculiar scruples of Hindus prevent the use of rice. Vegetables of all kinds, both cultured and wild, are objects of universal consumption ; among the latter description, not already noticed, may be mentioned the nettle, fern, tulip, *malú*, &c., of which the shoots, root, and bean, respectively, are eaten: the list of herbs, roots, and leaves, considered edible by the natives, is endless ; indeed, from their indiscrimination in this respect, fatal cases of poisoning sometimes occur. During the periodical residence of the agricultural classes in the Bhábar their principal food is the "*guiya*," or sweet potato, boiled and eaten with buttermilk. Animal food is in much request among all classes ; with the exception of those animals the use of which as food is prohibited by their religion, and excepting also reptiles of all descriptions and carrion birds or beasts, every sort of animal is converted to food in some part or other of the hills: by the southern Garhwális rats and mice are considered as dainties. The favourite flesh is that of the goat, or of the sheep, where bred: against the sheep of the plains an universal prejudice exists, its long tail rendering it, in the eye of the highlander, a species of dog. No scruple as to the mode of decease exists, and animals dying a natural death from disease, or other cause, are eaten by the Hindus as well as by the Doms."

Stewart also in his interesting report on the food of the people of the Bijnor district, which lies at the foot of the Garhwál hills, notices many points which have an interesting bearing on the lessons learned by experience as to the dietetical value and effect of each food-grain. He writes :—

"The prices of the various staple crops would appear to have a greater effect on the relative quantities of those consumed at different periods of the year than opinions connected with their wholesomeness, &c. Still, the latter consideration has its weight in determining the choice of certain kinds of food at certain seasons. Thus, in the cold weather, much more *bájra*, which is considered "heating," is consumed, with a large proportion of salt and spices, than at any other time ; and in that season generally, one meal a day, at least, consists of pulse with rice in the form of *khíjri*. *Baghar*, or rice made into meal with its inner husk, is also a favourite kind of food in the cold weather. In the hot season, again, rice is the cereal most used, and this accords with the fact that its comparative consumption is found gradually to increase towards Calcutta, and to decrease towards Afghánistán, so that in the Upper Panjáb it constitutes a very small proportion of the food of the people, and wheat and maize are very much used. In the rainy season more wheat appears to be eaten than at any other time of the year, very often in the form of *gochni* bread, with about one part in four of pulse-meal. The labourer, if not in straits, always has two meals a day, the fullest being the morning one, at 6 to 8 A.M., before he begins, or during an interval of, his work ; the evening one, after the day's labour is finished : but, of course, the change of the seasons, the weather, and the nature and place of his work, cause considerable variation in this respect.

"The staple of food of the labouring classes in this as in most other countries consists of one or other of the cereals, here generally combined with a considerable amount of pulse. From very many enquiries the average consumption of adult labourers, male and female, appears to be about ten or twelve *chhattáks* (20 to 24 oz.) a day of meal, or rice, with about two *chhattáks* (4 oz.) of pulse. The average weight of the adult males admitted into Bijnor jail in six months was—Hindus, one maund and ten seers (100℔.), and Musalmáns, one maund and eight seers (96℔.); and since this may be assumed as a tolerably close approximation to the average weight of the adult male inhabitants of the district, the above quantity of food seems liberal when compared with the amount which has been found to support healthy persons in Europe, where the average weight of individuals is probably considerably higher than here. Less invariable (than pulse) but still very frequent concomitants of the bread or rice consumed are greens and *tarkári* of gourds and other vegetables, and, in the season, one or two kinds of fruits, especially the mango. These not only have their uses in supplying fresh vegetable juices to the economy, but also add to and vary the sapid elements of the food, and thus, besides satisfying the natural craving for flavour, they also aid in stimulating the process of digestion, although, both theoretically and practically, an excessive amount of such food taken habitually is deleterious. A more constant error of the labourer is that of making his cakes too thick and under-cooking them. The reasons for this practice are, that it saves trouble, time, and fire, and produces the feeling of satiety with a smaller quantity. It is barely necessary to observe that the practice is calculated to injure digestion seriously (and in native regiments I have very often found that it materially interfered with convalescence from certain diseases of the alimentary canal). Hill men eat greedily all kinds of fruits, both cultivated and wild, and very rarely allow either to ripen thoroughly. The number of wild fruits and berries is very large, and the supply lasts from April to October, forming a welcome, though not perhaps always a healthy addition to their food.

"The average quantity of animal fibrine consumed by the labourer must be very small indeed, as meat is but rarely eaten by him, and then generally only in quantity sufficient to constitute a relish to his ordinary vegetable diet. The place of the oleaginous element which is, among meat-eating nations, mostly derived from flesh, is here filled by the very large amount of animal and vegetable oils consumed in various ways, especially as adjuncts in cooking vegetables, &c., and in the protei-form sweetmeats. The amount of spices taken is also large, and is probably, to some extent, necessitated by the rarity of the stimulus of meat, and by the considerable proportion generally borne by crude vegetables to the other articles of food. Sugar likewise is used in larger quantity than in temperate climates, but I should think not more than, if so much as, is used in other countries where the sugarcane is cultivated."

Watson's formula.

Dr. Forbes Watson has published a most useful table, showing the properties of nitrogenous substances which can be combined to the best advantage with carbonaceous ones; that is, of pulses to be combined with cereals arrowroot, sago, millets, and the like. By a simple formula we can find out the quantity of a pulse that should be added to a carbonaceous substance, provided only we know from previous analysis the amount of carbonaceous and nitrogenous matter in each, from which we can deduce the proportions of carbonaceous to nitrogenous in each, representing nitrogenous as unity.

Then, to find the quantity of one substance to be added to the other, we have this formula :—

Let the proportion of nitrogenous to carbonaceous in the given substance be $m : 1$. Let the proportion of nitrogenous to carbonaceous in the substance required to be added be $n : 1$.

Then the standard proportion or best possible combination (which is 6 carb.: 1 nit.:) $= p : 1$. Let the number of parts in the given substance be a, and the number required to be added be x, then—

$$x = \left\{ \frac{m\ (p+1)\ (n+1) - p(n+1)\ (m+1)}{(p-n)\ (m+1)} \right\} a.$$

Or simplified, $x = \left\{ \frac{(m-p)\ (n+1)}{(p-n)\ (m+1)} \right\} a.$ This will be clear from an example. Let it be required to know what proportion of a pulse, say gram, should be added to a hundred parts of arrowroot to give the best combination. By analysis we know that the proportion of carbonaceous to nitrogenous in arrowroot is 165·5 : 1, and in gram is 3·8 : 1 : then in the formula m will be represented by 165·5 ; n by 3·8 ; p by (the standard known) 6, and a by 100 : so

$$x = \left\{ \frac{(165{\cdot}5 - 6)\ (3{\cdot}8 + 1)}{(6 - 3{\cdot}8)\ (165{\cdot}5 + 1)} \right\} 100 = \left\{ \frac{765{\cdot}60}{366{\cdot}96} \right\} 100 = 2{\cdot}09 \times$$

$100 = 209{\cdot}0 =$ the number of parts required ; that is, that 209 parts of gram to 100 parts of arrowroot makes the best combination. This formula is of great value in settling jail and hospital dietaries.

A—CULTIVATED FOOD-GRAINS.

Cultivated food-grains.[1]

The cultivated crops are divided into those of the *rabi* or sown in the autumn and reaped in the spring and those of the *kharíf* or *chaumás*, sown in the summer and reaped in autumn, exactly as in the plains, for the influence of the periodical rains is felt in all the hills on this side of the snowy range. In the hills, the staple crops are the same as they were sixty years ago, wheat and barley in the spring, and rice and *mandua* in the autumn; in the tract along the foot of the hills rice and arum are the principal rain-crops, and wheat, barley, and mustard the chief spring crops. Dividing the cultivated food-grains amongst the great natural orders, we have as follows :—

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[1] A botanical description of each of these plants will be found in my 'Notes on the Economic Products of the North-Western Provinces,' Part IV., Allahabad, 1881.

GRAMINEÆ OR GRASSES.

Triticum vulgare, Linn., wheat—*gehún, naphal.*
Hordeum hexastichon, Linn., barley—*jau.*
„ *himalayense*, Linn., celestial barley—*ua-jau.*
Oryza sativa, Linn., rice—*dhán.*
Zea Mays, Linn., maize—*bhútta, júnala, mungari.*
Paspalum scrobiculatum, Linn.—*kodo, kodra.*
Panicum miliaceum, Linn.—*china, ganára.*
Oplismenus frumentaceus, Link.—*mandira, jhangora.*
Setaria italica, Kth.—*kauni, koni, kúkni.*
Penicillaria spicata, Lam.—*bájra.*
Eleusine Coracana, Gærtn.—*mandua.*
Avena sativa, Linn., oats—*jai.*
Sorghum vulgare, Pers.—*joár, júnali.*
Saccharum officinarum Linn., sugarcane—*ikh, rikhu, ganna.*

LEGUMINOSÆ OR PULSES.

Cicer arietinum, Linn., gram—*chana, chola.*
Ervum Lens, Linn., lentils—*masúr.*
Vicia Faba, Linn., bean—*bákla.*
Lathyrus sativus, Linn., *kisari, chapta.*
Pisum sativum, Linn., pea—*kalon, kulai.*
Phaseolus aconitifolius, Jacq.—*moth.*
„ *Mungo*, Linn.—*mung, chhimi*
P. Mungo var. *radiatus*, Linn.—*urd, mash, chhimi, rutndar.*
„ *Torosus*, Roxb.—*guransh.*
Phaseolus vulgaris, Linn., bean—*shimi, sem.*
„ *multiflorus*, Willd., scarlet runner.
„ *coccineus*, Lam., ditto variety.
Vigna Catiang, Endl.—*lobiya, riansh.*
Dolichos biflorus, Linn.—*gahat.*
„ *Lablab*, Linn.—*shimi.*
Cajanus indicus, Spreng.—*arhar, rahar, túr.*
Glycine Soja, Sieb.—*bhat.*
Cyamopsis psoralioides, D. C.—*gawár.*

CHENOPODIACEÆ.

Chenopodium album, Linn.—*bethua.*

AMARANTACEÆ OR AMARANTHS.

Amaranthus frumentaceous, Buch.—*chua.*
" *caudatus*, Moq.—*kedári chua.*
" *Blitum*, Linn.—*chamli.*

POLYGONACEÆ.

Fagopyrum esculentum, Mœnch., buckwheat—*ogal*, *pálti.*
" *tataricum*, Gœrtn., buckwheat—*phápur.*

CEREALS.[1]

Triticum vulgare, Linn.—Wheat, and **Hordeum hexastichon,** Linn.—Barley. There are four recognized varieties of wheat :—(1) *gehún safed* or white wheat ; (2), *dáúd-khání* or *dáwa*, a white awnless variety grown in large quantities in the Kosi valley near Somesar ; (3), *daulat-khání* and (4) *lál-gehún*, *tánga* or *jusher*, the bearded varieties. Wheat is called generically *kanak* or *gehún*, and by the Bhotiyas *náphal.* The flour is known as *áta* or *kannik.*

There are also several varieties of barley known generically as *jau ;* a short-awned variety is called *rena.* When barley is sown and reaped together with wheat, the mixed grain is called *gojai ;* and with gram or peas or lentils, it is known as *bijra.* In both these cases the grains are grown together and cooked and eaten as one. Mixed wheat and gram is called *gochni* below the hills.

Wheat and barley usually follow rice in the same fields. These are prepared in Asauj (September-October) by ploughing and cleaning, and, when practicable, they are irrigated by turning into them a stream from some river. The irrigated fields are sown in October-November and the uplands in November-December. The seed is sown in furrows (*siya*), which are again covered in by the plough, whilst the clods are broken by the *dalaya* and again smoothed by a heavy flat wooden log (*maya*) drawn by oxen and kept steady by a man standing on it. Barley ripens in March-April and wheat a month later, and yield about tenfold the seed sown. Both are cut in the middle of the stalk with a sickle and tied in sheaves (*úntha*) and stacked near the homestead to dry. When dry, the sheaves are unbound and threshed out by a flat wooden board with a short handle known as *mungra.* In some of the north-eastern

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[1] A botanical description of each species and full notes on localities, uses, &c., will be found in my 'Notes on the Economic Products of the North-Western Provinces,' Part IV.

Pattis of Kumaun a primitive form of flail is used in the shape of a long pliant stick. The chaff is used as fodder; cow-dung ashes (*khoriya*) are mixed with the grain when stored, to prevent the attacks of insects. The variety *H. Ægiceras*, mentioned by Thomson (p. 102) as that 'curious, awnless, monstrous barley, is peculiar to the highlands of Tibet, where it is extensively cultivated'. It ripens in August in the Pruang valley. At the same time that wheat is sown, and often on the borders of the same fields, *masúr* (*Ervum Lens*) and gram (*Cicer arietinum*) are cultivated in quantities.

Hordeum himalayense (*cœleste*)—*Ua-jau*, the *chámа* of the Bhotiyas of Dárma.

This species is only grown in villages bordering on the snowy range and at high elevations, 7-12,000 feet. The seed is sown in first-class unirrigated land in October and ripens in May. The average yield per acre is about fifteen loads, worth one rupee a load, and raised at a cost of about eight rupees an acre. The produce is consumed locally by the Bhotiyas, being esteemed much too poor a food for the lowland folk.

Rice.

Oryza sativa, Linn.—Rice. This widely-distributed grain is, as may be supposed, the principal rain-crop in the lowlands, and is also largely cultivated in the hills up to 6,500 feet, where some of the most valuable varieties are raised in the deep, hot valleys. It is an annual, belonging to the natural order *Gramineæ*, having numerous culms, erect, jointed, round and smooth, the leaves sheathing and long, scabrous outside and the panicles terminal. The local names of the varieties are almost endless; the principal recognized in the Kumaon Division are the following:—

Dhán.
Bánsmáti.
Hansráj.
Gajlo.
Uya.
Jamol.
Bakuwa.
Timtliya.
dhesuwa.
dúda.
sishali.
anjan.
amdrasi.
sál.
katyúri.
gajaliya.
sathiya.
dhaniya.
banpása.
iauliya.
kirmuli.
nauliya.
rakasuwa.
muthamuth.
dháni.
badatiya.
haltuniya.
motiya.
adarat.
maisuwa.
andi.
geruwa.
makani.
jogyána.
ratuwa.
akari.
rasiya.
parayai.
chinkuli.
chinabhuri.
batasuwa.
makarat.
rájbhati.
rupasuwa.
halduwa.
mandkuri.
sálam.
páliya.

In the hills, the agricultural year commences about the middle of February, when the land has to be prepared for the rice-crop, which is usually sown where *mandua* has been raised in the previous season. The manure from the cattle-sheds is spread over the ground which is then ploughed and freed from stones. The terrace walls are repaired and the roots of the *mandua* from the last crop are collected and burned. In Baisákh (March-April) or Jeth, (April-May), the land is ploughed again and the seed is sown in the furrows, which are closed by a flat log of wood drawn along them. When the young plants have risen to some three or four inches in height, a large rake or harrow is drawn over the ground to remove the weeds and thin the plants. Where water is abundant, the better sorts of rice are sown in a highly-manured and irrigated nursery (*bihnora*) or seed bed. This is first flooded with water and then ploughed until the soil becomes a semi-liquid mass. Manure is then added and the seed is sown on the top and covered over with leaves, especially those of the *chír*, which are said to decompose easily in water and form an excellent top-dressing manure. The young plants are transferred (*ropa*) from the nurseries by the women and children in June-July to the open field. The manure used is commonly the sweepings of the cattle-pens, which are collected in regular heaps on a place set apart for it in the field, usually that in which the cattle have been regularly penned (*khatta*), to economise the collection of their droppings. Leaves also are collected and allowed to rot in heaps on the field, and twigs and branches of trees are burned and the ashes made use of. The latter are usually taken from the village forests and cost nothing but the labour in gathering and stacking them. When the field is a small one, the earth is loosened and the weeds removed by a small iron sickle (*kutala*). In July-August the weeds are again removed, whilst the land is kept inundated with water, and by the end of August the poorer highland varieties are ready, and by the end of September or beginning of October the finer sorts grown on the lowlands. Rice is cut from the root and stored on the field in stacks (*kanyúra*) with the ears inwards. There it is left for four or five days to dry, and after that the grain is trodden out by cattle on a threshing-floor paved with slates (*khala*) or simply by men on mats (*moshta*). The stalks (*puncál*) are made up in bundles (*púla*) and stored round a pole or in the fork of a tree and afford food for cattle and bedding for the poor. The grain is taken home, and, after being dried on the roof of the house, is stored for use in boxes (*bhakár*) or in baskets plastered with mud or cow-dung, called *korangas* or *dálas*. Unhusked rice is known as *dhán* in Kumaun; and before husking it is again dried in the sun and then pounded in a wooden or stone mortar called an *ukhal*. The pestle (*musal*) in use is tipped with iron, and the grain is pounded three different times before the clean rice or *chánwal* is produced. The chaff (*chila*) is used as fodder for cattle, and the husk (*pithi*) of the third pounding, by the poor. Winnowing is performed by a shovel-shaped basket (*supa*) which is held at such an angle to the wind as allows the chaff to fly off, or the grain is placed on the ground and the basket is used as a fan. One *náli* or about four pounds of rice-seed produces in irrigated land 35 *nális* of unhusked or one-half that amount of husked rice, and rice-seed in upland unirrigated land about half as much. Dry upland rice ripens from early September; common irrigated rice from early October and the better irrigated sorts from the middle of October. In Dehra Dún there are three principal varieties,[1] the *chaitru*, *haltyu*, and *kyári* or transplanted. The first, which is also known as *chambu* or *anjana*, is sown in unirrigated land in March-April (*Chait*) and is cut in August-September. *Haltyu* is sown a month later in similar land and is cut in September; it is also known as *anjani* and *naka*. The *kyári* furnishes rice of the best quality; the seeds are sown in nurseries in April-May, and the young plants are transferred in the following two months to wellirrigated fields, where they are carefully weeded. The principal varieties are the *ramjawáin* and *básmati*, and these grow best in warm valleys and along the great rivers where there is much moisture. *Chánwal* cooked in water is called *bhát*, but the broken grains (*kanika*) when cooked are called *jaula*. *Khijri* is a mixture of rice with *urd* or *bájra* boiled together in water; and *khír* is rice boiled in milk. The commoner varieties are often made into bread, and in that case the grain is only husked once and the inner husk is left on to be ground into flour, called *baghar* in Garhwál.

Zea Mays, Linn.—Indian-corn, maize;—*Bhútta*, *mukui* (Kumaun); *mungari*, *júnala* (Garhwál). The maize plant is grown in small quantities in the hills for the heads which are usually roasted whole, and the seed is then eaten from the cob (*chúchi*). The seed is sometimes ground into flour and made into bread either alone or with the flour of *moth*.

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[1] Memoir, 22.

Paspalum scrobiculatum, Linn.; *P. kora*, Willd.—*Kodo, kodra, kodram*.

An annual belonging to the natural order *Gramineæ* and sub-order *Paniceæ*, cultivated in the sub-Himálayan districts. Dr. J. L. Stewart writes[1] of the Bijnor district: "*Kodra* is said to produce cholera and vomiting, and I find that some authors mention a similar phenomenon as occasionally occurring in all three presidencies. The natives generally hold that with the ordinary *kodra*, and undistinguishable from it, grows a kind that they call *majna* or *majni* which produces the above effects, but it has been suggested with greater probability that these depend on the use of the new grain under certain conditions." These results are, however, uncommon, as they are seldom met with, and the grain is a favourite one for home consumption amongst the poorer classes. It is husked with the pestle (*músal*) and frequently eaten unground called *chánwal* in the Bijnor district, a term usually applied to husked rice. *P. longiflorum*, the *kúna* of Kumaon, grows wild and its seeds are also used as food. Roxburgh, 93; Drury (F. P.), III., 565.

Panicum miliaceum, Linn.—The *chína* of the hills and *chínia sáwán* of some places, of which the *ganára* or *gandri* variety (*P. uliginosum?*) is grown extensively in the Bhábar. It is an annual with erect, round culms, belonging to the natural order *Gramineæ* and the sub-order *Paniceæ*. It is cultivated in the hills up to 6,000 feet and the sub-Himálayan tract, and is noted by Madden as apparently wild at Háwalbágh. It is a very delicate plant, sown in March; it ripens in May in the Bhábar, and is grown chiefly for immediate consumption. In the hills it is occasionally sown in May-June up to 6,000 feet in a few villages and ripens in August. The average outturn per acre in the hills is about 25 loads of unthreshed grain, worth about Rs. 20, and raised at half that cost. The seeds are white and smooth like sago, and are considered a fit food for invalids. They are husked by the pestle and mortar, and, like *kodra*, are often eaten unground under the name *chánwal* in the Bijnor district. It is known as a *tínpákh* or "three-fortnight" grain, that being the time required for its production from sowing to cutting, and is therefore one of those allowed as food to devout Hindus during fasts. *P. brizoides*, Jacq., is occasionally cultivated under the name *bárti* for the same purpose. Roxburgh, 104.

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[1] J. Agri-Hort., XIII., sec. 50.

Oplismenus frumentaceus, Link.—the *mandira* and *jhangora* of Kumaun, *jhángara* of Garhwál, the *sáman* of the Bhábar, and *sáwan* of the plains; *syámák*, Sanskrit.

This is a small hardy annual belonging to the natural order *Gramineæ* and sub-order *Paniceæ*, cultivated throughout the hills up to 6,500 feet and in the submontane tracts. It thrives best in soils tenacious of moisture or which receive plenty of rain, and is sown in July and gathered in September. The ears are cut first, and the stalks afterwards as fodder for cattle. It is also one of the "*tínpákha*" or "three-fortnight" grains, coming to perfection in about six weeks. It has culms erect, 2-4 feet high, panicle erect; spikes secured, incurved; flowers three-fold unequally pedicelled; leaves large, margin hispid. The grain is considered heating, but when kept for four or five years loses that quality. It is chiefly consumed by the poorer classes made into *khír* (boiled with milk), *khuskháb*, *khijri*, &c. It is the *Panicum frumentaceum* of Roxburgh, 102. *O. colonus*, Kth., occurs wild and occasionally cultivated or rather allowed to grow under the name *jangli-mandira*.

Setaria italica, Kth.; *Panicum italicum*, Linn.; *Pennisetum italicum*, R. Brown.—Italian millet. The *kauni*, *koni* of the hills, *kúkni* of Bijnor, and *kangni* of the plains.

This is an annual with culms erect, 3-7 feet high, round, smooth; roots issuing from the lower joints; margins of leaf hispid; mouths of the sheaths bearded; spikes nodding; spikelets scattered; seeds ovate; cultivated in the hills up to 6,500 feet and in the submontane tracts. In the hills it is sown with *mandira* or along the edges of rice-fields for home consumption in April and gathered in September. An unmixed field of *kauni* is very uncommon. The ears are cut off while the crop is standing and the stalks are only used as bedding for cattle. As a food, natives consider it to be cool and dry, astringent and diuretic, and to be of use externally in rheumatism. When taken as the sole food it is said to be apt to produce diarrhœa. It renders beer more intoxicating. In Madras its flour is highly esteemed for pastry. Roxburgh, 102; Drury (U. P.), 338

Penicillaria spicata, Willd.—Spiked millet—*Bájra.*

This millet is also occasionally grown along the foot of the hills and in the lower valleys within the hills, but *bájra*, *joár*, and maize are essentially plants of the plains proper. Roxburgh, 95.

Eleusine Coracana, Gœrtn.; the *mandua* or *maruwa* of the hills, *kodo* of parts of the western hills and *raghi* of the south of India. *Mandua* belongs to the natural order *Gramineæ* and sub-order *Chlorideæ*, and has an erect culm supporting from four to six spikes, digitate, incurvate, from one to three inches long, composed of two rows of sessile spikelets, each consisting of from three to six flowers. Calyx formed of two glumes: seed covered with a thin, pellucid, membranceous aril. It is the staple autumn or *chaumás* (*saoni* in Dehra Dún) crop of the highlands (up to 8,000 feet) between the Tons and the Sárda, and forms the main food-resource of the agricultural classes. It gives a larger yield than other crops, and is said to increase in bulk when ground, qualities that have probably led to its more general cultivation, as it is a poor and very coarse grain. Indeed, Madden terms it "a bitter and indigestible food." *Mandua* is cultivated both in ordinary agricultural land and in freshly cleared jungle. In ordinary land, it usually follows a wheat crop which is gathered in April-May, and the land is at once prepared for the *mandua* in the same manner as for rice. The seed is sown broadcast, and, instead of a harrow, the bough of a tree is drawn over the newly-sown land to cover the grain. When the young plants have risen two or three inches, the whole field is harrowed two or three times and the vacant spaces are filled up from those where the plants are in excess. Seeds of the *gahat*, *urd*, *bhat*, and other similar grains are then sown in the midst of the *mandua*, and their produce is collectively called *kán* in Kumaun. Later on the crop is well weeded with the *kútala*, and in October-November the ears of the *mandua* are cut off and the *kán* are rooted up. Afterwards the stalks (*naluwa*) of the *mandua* are cut and tied in bundles and stacked like those of rice to serve as fodder, or cattle are driven into the field and allowed to consume them. The ears of the *mandua* are stacked (*thupara*) for some twenty to twenty-five days, when they begin to ferment, and, when warm, they are spread out and dried and are then threshed out by a flail (*saila*), or are trodden out by cattle. Winnowing is performed by the *súpa* as in the case of rice, and the heap formed is then passed through a sieve (*rangra*) before being stored. The chaff (*dhúsi*) is used as fuel for cooking and its ashes as a dye and for washing clothes. The chaff (*nat*) of the *kán* is useful for fodder. *Mandua* is ground into flour of a somewhat rough and astringent taste, and made into unleavened cakes or a kind of porridge called *bári*. A spirit called *dáru* is also made from it and sells at from three to six annas per bottle. A variety called *mandín* has usually 3-4 spikelets which are not incurvate and ripen in September. *E. indica*, the *mandavi* of the tract along the base of the hills, is common in the hills and Bhábar.

The rent per *bisi*, which is only forty square yards less than an acre, varies from one-fourth to one-half the crop, and may be set down as about two rupees. The cost of ploughing and harrowing where cattle are hired would be about two to two and-a-half rupees per *bisi*, and for labour whilst the crop is on the ground about the same amount. Seed, sowing, cutting and cleaning the grain about three rupees,[1] giving a total expenditure of ten rupees per *bisi*. The average outturn is between fifteen and twenty maunds of forty seers each, worth about one rupee a maund. *Mandua* is one of the favourite crops with squatters in the forests. Their mode of operation consists in felling the timber and clearing patches along the ridges in autumn, and when the timber is dry it is burned in spring, and *mandua* is then sown in the ashes and lightly ploughed in or hoed in by hand. No other labour is required beyond roughly fencing in the patches with the half-burned logs and watching them at night to prevent the incursions of wild animals. The cost of production is much less than in ordinary land, and no rent is paid, as but one crop is taken, after which the patch lies fallow for from six to twelve years. This mode of cultivation is, according to the nature of the soil, known as *katil*, *kála banjar* or *ijrán* in Kumaun and as *khil* or *kándala* in Garhwál. In ordinary land there is a formal rotation of crops. Thus, rice is sown in April and gathered in September, after which the land is prepared and yields a crop of wheat or barley, which is cut in April, and is succeeded by *mandua*, and as the last is not ready for the sickle until November, the land is allowed to remain fallow until the following spring, when rice is again sown. Where land has been long allowed to lie fallow, a crop of *mandua* or *chúa* or buckwheat is usually taken first, and, as a rule, a field is allowed to lie fallow after every third crop, except in a bad year. In the Bhábar, mustard is sown in August and gathered in February, when it is followed by the *gandára* variety of millet which is ripe in May. Then wheat is sown, which is followed by rice in the next spring. In the older villages nearly half the land, especially that on which rice has been sown, is allowed to lie fallow one season. In new villages land is cropped without intermission for several years. Roxburgh, 115; Drury (U.P.), 206.

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[1] Sowing four annas; seed at twelve seers per *bisi*, eight to ten annas; cutting and winnowing, for the former eight and the latter four men, would cost from 24 to 36 annas.

Avena sativa, Linn.—Oats—*Jai*, *wiláyati-jau*. *Jai* is grown in small quantities in the hills (6-10,000 feet) and in the Dún for local consumption. In the hills it is usually sown mixed with barley and the two are eaten ground up together. *A. fatua* seems to occur wild.

Sorghum vulgare, Vers.; *Holcus Sorghum*, Linn.—Great millet—The *júnali* of the Bhábar and *joár* of the plains.

This millet is grown in very small quantities near houses here and there in the Bhábar and in parts of the hills up to 5,000 feet. *S. Halepense*, Linn., occurs wild in the Bhábar, under the names *buru* and *rikhonda*. *Júnali* is grown in the plains for its seed and sown closely as a fodder, which is acceptable to, and greedily eaten by, cattle of all sorts, notwithstanding the size of the stalks. Roxburgh, 90; Drury (U.P.), 413; Steudel, 384.

Saccharum officinarum, Linn.—Sugarcane—*Ikh*, *rikhu*, *ganna*, *puna-rikhu* (large variety), *kanthi-rikhu* (small variety). Though the sugarcane is not a food-grain, it may be noticed here as belonging to the *Gramineæ*. It is only occasionally cultivated in the hills, notably near Dwára Hát and Gangoli Hát, but is largely grown in the submontane tract and the Tarái. The details of manufacture for export do not differ from the system generally observed elsewhere.

PULSES.

The pulses belong to the natural order *Leguminosæ* or pea-tribe, and afford a large quantity of the food-resources from the vegetable kingdom in these provinces. Of those raised by field cultivation, *múng*, *másh*, and *masúr* are often eaten unhusked by the poor. The two first and gram or *chana* are held in high repute, though all are considered, when eaten alone, to be apt to produce colic and flatulency. Gram, peas, and a few others are occasionally ground into a flour called *besan* and made into bread either alone or in the proportion of one-fourth with cereals. Thus, wheat is ground with gram, maize with *urd*, and the millets with *moth*. Pulse bread alone is only resorted to when nothing better can be obtained. *Másh* and *múng* split in two and then known as *dál* are usually eaten separately or with rice, when the mixture is called *khijri*. *Múng* and *urhar* are reckoned as good nutritious food for invalids; but *moth* and *masúr* are considered less valuable as causing heat and thirst. *Masúr* is said to be the source of the well-known Du Barry's *Revalenta Arabica* Gram, peas, *múng*, *moth*, and *lobiya* are frequently parched by tradesmen known as *bhúnjas*, and, under the name *chabena*, form the usual food for persons going on a journey or employed so as to prevent their being able to cook their regular meals. The usual mode of preparation, however, is to boil the pulse, after removing the pod, and serve with condiments of various kinds as shred onions, turmeric, spices, &c. Eaten with boiled rice, they form one of the staple dishes of the country (*dál-bhát*), and in this form are said to be most wholesome, the cereal correcting, to a certain degree, the heating properties of the pulse.

Cicer arietinum, Linn.—Gram—*Chana*. The gram plant is sparsely cultivated in the hills. It is a naturalised plant, a native of Europe, deriving its name from the pea having a supposed resemblance to a ram's head (*aries*). It belongs to the natural order *Leguminosæ* and sub-order *Viciæ*. There are four varieties, black, white, red, and yellow, the last of which is that usually found here. It is cultivated in the warmer localities, usually as a border to wheat, and ripens in February. The *bhúsa* of the stalks and leaves forms a valuable fodder for cattle and horses, and the green leaves are eaten as a pot-herb. Hook. Fl. Ind., II., 176: Roxburgh, 567. *C. microphyllum*, Benth., a wild species growing in Tibet, is remarkable for a very viscid exudation and its strong odour (Thomson's Travels, 371): Drury (U.P.), 134.

Ervum Lens, Linn.; *Cicer Lens*, Willd.—Lentils.—*Masúr*, an annual belonging to the natural order *Leguminosæ* and sub-order *Vicieæ*, is sparsely cultivated in the hills, but is increasing in favour in the Bhábar. The seeds split in two are used as a *dál*, but they are commonly regarded as heating. It also is sown at the border of fields and ripens in February. Roxburgh, 567.

Vicia hirsuta, Koch. This plant is found wild near Almora, and is occasionally cultivated as a fodder under the names *masúri*, *masúr-chana*, and *jhanjhaniya-kúri* up to 5,000 feet in Kumaun and also in the Tarái. Hook. Fl. Ind., II., 177.

Vicia Faba, Linn.—The garden bean—*Bákla*. This bean is cultivated occasionally for its seed and straw up to 8,000 feet. There are several varieties sown from introduced seed or native seed either in fields or gardens. *V. sativa*, Linn., var. *angustifolia* (Hook Fl. Ind., II., 178) and *V. tenera* occur wild.

Lathyrus sativus, Linn.—The chickling vetch—*Kisára*, *churál*, *chapa*, *mattar*, *kúsa*. This species is occasionally cultivated below the hills and in the hills up to 8,000 feet. The evil effects of this pulse is unknown in Bijnor and the Bhábar, though it is said to produce paralysis in Allahabad. *L. sphæricus*, Retz., and *L. Aphaca*, Linn., are found wild.

Pisum sativum. Linn.—The field-pea—*Kalon*, *kulai*, *batana* (Jaunsár). This well-known annual has been introduced from Europe. The seeds are round, of uniform colour, and there are 5-6 leaflets. Another species, *P. arvense*, Linn., having 2-4 leaflets and compressed marbled seeds, is said by Royle to be a native of India. It is cultivated in small quantities up to 8,000 feet in the hills. Hooker, Fl. Ind., II., 181.

Phaseolus aconitifolius. Jacq.—The aconite-leaved kidney bean—*Moth*. This species is chiefly grown in the submontane tract in the poorest soils and is of little account amongst food-resources here except in dry seasons. Hooker, *ibid.*, 202 : Roxburgh, 558.

Phaseolus Mungo, Linn.—The small-fruited kidney bean.—*Múng, chhími, chikan*, and var. *radiatus*, Linn.—rayed kidney bean; *urd, másh, chhími ruindár.*

Both these varieties are cultivated in Kumaun up to 4,500 feet. The former is rare and has greenish yellow flowers, pods 10-15 seeded, and seeds with numerous longitudinal close streaks. There are four varieties, green, black, yellow, and white, of which the first is most common : ripens in October. The second has yellow flowers, pods very hairy, 4-6 seeded ; two varieties, black and green, and a third smaller plant occurs called *urdi*. It is a rain crop and is more commonly cultivated in the hills up to 6,000 feet. It is considered the most heating of all the pulses and is seldom eaten alone. Hooker, *l. c.*, 203 ; Roxburgh, 556. *P. Mungo* of Roxburgh is the common green *múng* ; the black variety is his *P. Max* and the yellow variety is his *P. aureus*, whilst *P. Roxburghii*, W. *et* A., is the same as *P. radiatus*, Linn., *urd* or *másh*, now reduced by Aitchison (p. 389) to a variety of *P. Mungo*, Linn.

Phaseolus torosus, Roxb.—*Guraush, gúránsh*. This species is grown at a higher elevation than any other pulse (6,500 feet), chiefly in Káli Kumaun, but also in Almora and the Bhágirathi valley up to 4,500 feet. It is apparently a cultivated form of *P. calcaratus*, Roxb. (Hooker, II., 204). There are two varieties, one of which has a red and the other a cream-coloured seed : ripens in October. Roxburgh, 558.

Phaseolus vulgaris, Linn.— French bean—*Shiuchana, bákula.* This and *P. multiflorus*, Willd. (scarlet-runner) are chiefly grown in gardens as pot-herbs. *P. coccineus*, Lam., differs by its bright scarlet, casually white, flowers arranged in long racemes which often overtop the leaves. Hooker, *ibid.*, 200.

Vigna Catiang, Endl. ; *Dolichos sinensis*, Linn. : both are now united—*Lobiya ridnsh, ráish, riensh.*

The first is low and sub-erect with pale purplish flowers ; the latter is tall and voluble. There are several varieties differing in the colour of the flowers and seeds (white, brown, yellow, black). Three or four are cultivated in Kumaun (up to 4,000 feet), of which one is known as *sonta*. All the varieties are usually sown with other crops. The young legumes are eaten as a vegetable and the ripe seeds in curries. Hooker Fl. Ind., II., 205 ; Roxburgh, 559, 560.

Dolichos biflorus. Linn.—Horse-gram—*Gahat, kalath*, the *kulthi* of the plains. The horse-gram is occasionally grown in the hills up to 6,000 feet and in the submontane tract. In the Bhábar it ripens in October. Hooker, *l. c.*, 210 ; Roxburgh, 563.

Dolichos Lablab, Linn.—Black seeded kidney-bean—*Shími, chími*. Six varieties of this species are commonly cultivated in gardens and very occasionally as a field-crop. Hooker, *l. c.*, 209 : Roxburgh, 560 : Drury (U. P.), 282.

Cajanus indicus, Spreng. ; *C. flavus* and *bicolor*, D. C. ; *Cytisus Cajan*, Linn.—Pigeon-pea.—*Arhar, rahar, tor, thohar*.

The pigeon-pea is occasionally cultivated in the hills up to 4,000 feet and in the submontane tract as a border to other crops and has a reputation for being easily digested and nutritious. *C. flavus* has the vexillum yellow, whilst *C. bicolor* has it beautifully veined with purplish red ; the latter is more commonly cultivated in Kumaun.

Glycine Soja, Sieb. ; *Soja hispida*, Mœnch.—Soy bean—the *bhat* of Kumaun, *bhatnas* and *bhatwas* of Nepál and northern Tirhút, and *Khajuwa* of the Tarái. This bean, though a poor food resource, is extensively grown in the hills 4-6,000 feet, as food for men and cattle. It ripens in October. Hooker, *l. c.*, 184 ; Roxburgh, 563.

Cyamopsis psoralioides, D.C.—the *gawár* of Meerut and *kauri, syámsundari, phali-gawár, kawára* and *kachhár* of the submontane tract. It is sown with other rain crops or along the borders of the fields in the rains in favourable places, but will not stand either excess of moisture or high winds. The legumes are delicate and are used in vegetable curries when young, and when mature they are boiled and with a little mustard-oil given to cattle as a condition fodder. Drury (U.P.), 179.

CHENOPODIACEÆ.

Chenopodium album, Linn.—Goosefoot—*Bethuwa, chardi, jau-ság*. An annual which occurs (cultivated occasionally) in the hills up to 4,000 feet. It is gathered for its seed, whilst the young leaves are used as a vegetable. It is entirely a rain crop and attains a height of six feet. The seeds ripen in October and are considered nutritious. Roxburgh, 260.

AMARANTHS.

Amaranthus frumentaceus, Buch.—Prince's feather—*Chúa, chúa-mársa, rámdána, anárdána* of these hills and *batu, báthu, bathua* of Bisahr. There are two varieties, the red and yellow, both of which belong to the natural order *Amarantaceæ* and sub-order *Achyrantheæ*, pentandrous; stems and branches erect; leaves broad-lanceolar; panicles erect; leaves of the calyx daggered; capsules wrinkled, seed, solitary, round, pellucid with callous white margins. Calyx longer than the stamens; leaflets in both male and female with subulate points. Male flowers with five stamina: female flowers with 2-3 styles. *Chúa* is largely grown in the northern parganahs up to 9,500 feet, where it forms the staple food of the poorer classes and is a favourite crop in newly-cleared jungle, as it is not easily injured by bears and deer. It is sown in May and June in first and second class unirrigated land and yields about twenty loads to the acre. The produce of an acre is worth about sixteen rupees, and the estimated outlay is about half that sum. From an experiment conducted in the Botanical Gardens in Calcutta it was found that forty square yards of ground sown with this plant in June yielded twenty-one pounds weight of clear ripe seed in September, or thirty-one maunds to the acre. It also grows well from October to February in the plains. Some identify *chúa* with *A. Anardana* (*farinaceus*), and much remains to be done to clear up the synonymy of the amaranths. Roxburgh, 663.

Amaranthus caudatus, Linn.—Love lies bleeding—the *kedári chúa* of the hills. This species has an erect stem angularly-striated, glabrous, green; leaves long, petioled, ovate or rhombovate, narrowing at both ends, bluntish, emarginate, glabrous, green; spikes ascending: flowers sessile, green: bracts longer than the sepals, which are three in number. Cultivated in gardens or near the homestead in the hills for local consumption. The seed is sown in May-June and the crop is ripe in October. Drury (F. P.), III., 21.

Amaranthus Blitum, Linn.; Var. *polygonoides, A. polygamus*, Linn. Hermaphrodite amaranth.—*Chamli ság, chauldi*. This common species is sometimes grown along the edges of fields in the submontane tract as a pot-herb. Like all the amaranths, it is one of the *phaláhas* or food-grains which Hindus may eat during fasts.

POLYGONACEÆ.

Fagopyrum esculentum, Mœnch.—Buckwheat—The *ogal* of Kumaun, *kotu* of Garhwál, and *pálti* of the Bhotiyas. The Himálayan buckwheat belongs to the natural order *Polygonaceæ* and sub-order *Apterocarpeæ.* It is grown chiefly as a vegetable in the hills and is recognisable by its red flowers. It is frequently sown in newly-cleared forest land and ripens in September. The grain is exported to the plains under the name *kotu* and is eaten by Hindus during their fasts (*bart*), being one of the *phaláhas* or food-grains lawful for fast-days. It is said to be heating, but palatable, and is sold by the *pansári* or druggist, and not by the general grain-dealer. *F. cymosum,* Meissn., the *ban-ogal* of Kumaun, occurs wild in the lower hills.

Fagopyrum tataricum, Gœrtn. ; *F. emarginatum.*—Buckwheat,—called *phápar* or *páphar* by the Kumaunis and *bhe* by the Bhotiyas. It has a white or yellow flower and only grows at high elevations, 7-12,000 feet. It ripens towards the end of September or beginning of October. The seeds are oval, acute, nearly triangular with acute, smooth, brilliant angles, the size of a hemp seed, of ash-brown colour, whilst the seeds of the *ogal* are rounded.

B.—CULTIVATED VEGETABLES.

The vegetables grown in the Kumaun division are those noted below, which may be divided into three classes : (1) those like the gourds and melons that are eaten raw or cooked ; (2) those generally boiled in water with salt and spices or cooked with *ghí* (clarified butter) or oil, as the ordinary garden produce , such as radishes, onions, carrots, turnips, and the legumes of various plants and which are known generically as *tarkári* ; and (3) the leaves and stems of various herbaceous plants, cultivated and wild, which are boiled in water and form what is known as *ság* or greens and when cooked merely with sufficient water to prevent their burning, *bhangi* or *bhangiya*. The first class comprises a great proportion of the food of all classes during the months that they are in season and form one of the most important dietetical products of native horticulture. The second class forms the staple of curries eaten with split pulse or *dál* and the third class includes both plants specially cultivated as greens ; the leaves and parts of plants cultivated for seed, fruit or fibre, but not specially cultivated for greens, and the roots, bark, leaves, and flowers of an immense number of wild plants which are edible, and form a substitute for the cultivated plants with the poorer classes and with all, indeed, in times of scarcity. We shall divide the vegetables therefore into gourds, ordinary vegetables ; thirdly, those plants that are cultivated as greens ; and lastly, the principal wild plants that are considered edible and form a portion of the food of the people.

GOURDS.[1]

Gourds belong to the natural order *Cucurbitaceæ*, and are grown in the hills and submontane tract. They are annuals, climbing, having clasping tendrils on the stalk, hairy, drastic, pulpy and refreshing, but apt to produce evil effects if taken in inordinate quantities. The principal species, cultivated and wild, are noted below in order to give a general view of the entire order. They may be divided for their dietetic properties into three classes :—(*a*) the pleasant tasted, with a refreshing juice, usually eaten raw like the melon and water-melon : (*b*) the other edible gourds which are either insipid or bitter, and are all cooked before being eaten and (*c*) those cultivated or used for their medicinal properties only. The principal genera represented in the Kumaun division are Trichosanthes, Luffa, Cucumis, Citrullus, Cephelandra, Bryonia, Mukia, and Zehneria.

Trichosanthes palmata, Roxb.—The *indráyan* of Kumaun and *palwal* of the plains. This species may be known from its red globose fruit which is possessed of severely drastic properties when wild, though edible under cultivation when boiled. *T. dioica*, Roxb., the *palwal* of Bijnor, is also edible. Hooker, Fl. Ind., II., 606 : Drury, (*F. P.*), I., 467 ; Roxburgh, 695.

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[1] For a botanical description of each plant see my 'Notes on the Economic Products of the North-Western Provinces,' Part V.

Trichosanthes anguina, Linn.—Common snake gourd.—The *chachinda* of Kumaun and *chachinga* of Rohilkhand. This species is cultivated throughout the hills and plains. The fruit is greenish white, 2′-3′ long, and is usually eaten cooked. Hooker, Fl. Ind., II., 610; Roxburgh, 694: Drury (F. P.), I., 467.

Trichosanthes cucumerina, Linn.—The *jangli-chachinda* of Kumaun. The *jangli-chachinda* appears to be the wild representative of the preceding; the fruit is chiefly used in medicine, though it is edible. Hooker, *l. c.*, 609; Roxburgh, 694; Drury (U.P.), 440: Royle, 219.

Luffa ægyptiaca, Mill.—*Ghíya taroi* or *ghíya tori*. It may be known by its 5-angled leaves and 10-angled fruit. It is used much in curries, dressed as a vegetable with clarified butter and spices. Hooker, *l. c.*, 614; Roxburgh, 698; Drury (F. P.), I., 459.

Luffa acutangula, Roxb.—*Káli taroi* or *tori*. It has the lower leaves 5-angled, the upper leaves palmate, the seeds black and irregularly pitted and the fruit usually smaller and is commonly cultivated and highly valued as a vegetable. Hooker, *l. c.*, 615; Roxburgh, 698; Drury (U.P.), 291.

Lagenaria vulgaris, Sering.—Pumpkin or bottle gourd—*Lauka*, *tumri* (small variety), *gòl kaddu*. It is from this gourd that the bottle carried by mendicants is made; it is extensively cultivated along the foot of the hills. The pulp is eaten with vinegar or mixed with rice as a *chhachki* or vegetable curry. Hooker, *l. c.*, 613; Drury (U.P.), 383; Roxburgh, 700. This fine species was brought to Almora from Jabalpur in 1846 by the Bengal Artillery. The *tumri* variety is not edible.

Benincasa cerifera, Savi.—White gourd melon—*Bhúnja*, *petha*, *chál-kumhra*. Cultivated for its fruit, which is used in curries and as a vegetable. Fruit 1-1½ feet, cylindric, without ribs, hairy, ultimately covered with a waxy bloom. Hooker, *l. c.*, 616; Drury (U.P.), 76; Roxburgh, 700.

Momordica Charantia, Linn.—*Karela*, *karola*. There are two varieties well marked; the one with longer and more oblong fruit, and the other with fruit smaller, more ovated muricated and tubercled and numerous gradations between them. The fruit is steeped in water with a little salt and then eaten cooked in curries. Hooker, *l. c.*, 616 : Drury (U.P.), 306 ; Roxburgh, 696.

Momordica dioica, Roxb.—*Gol kánkra.* There are several varieties, of which the unripe fruit and tuberous roots form an article of food. *M. Balsamina* also occurs along the foot of the hills in wild state and in Bijnor. Hooker, Fl. Ind., II., 617 ; Drury (U.P.), 306 ; Roxburgh, 696.

Cucumis trigonus, Roxb.—*Bislombhi.* Found wild along the foot of the hills. Hooker, *l. c.*, 619 ; Roxburgh, 701.

Cucumis Melo, Linn.—Melon—*Kharbús*, and *C.* var. *utillisimus*, *kakri.* Both these varieties may be seen at Srinagar, but they are not cultivated in the hills generally or in the submontane tract. Hooker, *l. c.*, 620; Drury (U.P.), 172; Roxburgh, 701.

Cucumis sativus, Linn.—Cucumber—*Khíra, khírai, kakura.* This species is also cultivated for its fruit, and *C. Hardwickii*, Royle, the *air-álu* of Kumaun and *pahári-indráyan* of the plains seems to be only a variety of it. Both the latter and *C. himalensis* occur wild in the hills and Bhábar. *C. Momordica*, Roxb. (700), seems also to be a variety ; it is the *kachra* (unripe) and *phúnt* or *túti* (ripe) of the submontane tract ; names given from the fruit bursting when ripe, and is frequently cultivated. Hooker, *l. c.*, 620 ; Drury (U.P.), 173 ; Roxburgh, 700.

Citrullus Colocynthis, Schrad.—Colocynth gourd—*Indráyan* of the plains. Found along the foot of the hills ; only used in medicine. Hooker, *l. c.*, 620; Drury (U.P.), 135; Roxburgh, 700.

Citrullus vulgaris, Schrad.—Water-melon—*Tarbhúj, hindwána.* It is very sparsely cultivated in the Bhábar, and still more rarely in the hills. The seeds are eaten parched with other grain. The bitter variety is the *C. amarus* of authors. Hooker, *l. c.*, 621 ; Drury (U.P.), 174 ; Roxburgh, 700.

Cephalandra indica, Naudin.—*Bimba, kanderi ki bel.* It occurs wild, but is occasionally cultivated in the submontane tract, and the ripe fruit is eaten raw or cooked. Hooker, *l. c.*, 621 ; Drury, (U.P.) 144 ; Roxburgh, 696.

Cucurbita maxima, Duch.—Squash gourd.—*Kaddu, mítha kaddu, gaduwa.* It is frequently cultivated for its fruit which is eaten boiled: the seeds also yield a mild oil used in cooking and burning. Hooker, *l. c.*, 622; Drury (U.P.), 175; Aitch., 64.

Cucurbita moschata, Duch.—Musk-melon—*Kumhra.* It is cultivated below the hills for its fruit, which is esteemed highly palatable and nutritious. Hooker, Fl. Ind., II., 622; Roxburgh, 700.

Cucurbita Pepo, D.C.—Pumpkin or white gourd—*Kumhra, kondha, lauka,* and *kaddu-safed.* It is cultivated for its fruit. Hooker, *l. c.*, 622; Roxburgh, 700.

Bryonia laciniosa, Linn. It is found wild and is only used in medicine; the seeds also yield a medicinal oil. Hooker, *l. c.*, 623; Drury (U.P.), 87; Roxburgh, 703.

Mukia scabrella, Arn.—*Gwdla-kakri.* It occurs wild and is only used in medicine. Hooker, *l. c.*, 623; Drury (U.P.), 88; Roxburgh, 702. *Zehneria umbellata*, Th., known under the same vernacular name, and its variety *Z. nepalensis*, occur wild in Kumaun.

VEGETABLES.[1]

Brassica Rapa, Linn.—Turnip—*Shalgam;* the *chankan* of the Bhotiya parganahs. The turnip is beginning to form an article of food. The Brahmans and Baniyas of the plains have a prejudice against the turnip and carrot as in some manner resembling flesh, which is forbidden as food for them. Hooker, Fl. Ind., I., 156; Roxburgh, 497.

Raphanus sativus, Linn.—Radish—*Múli.* Both the long radish and the turnip-shaped radish are now largely cultivated and consumed.

Hooker, *l. c.*, 166; Roxburgh, 500.

Lepidium sativum, Linn.—Cress—*Hálim, hálang.* Hooker, *l. c.*, 159; Roxburgh, 497.

Hibiscus esculentus, Linn.—*Bhindi.* This and *H. sabdariffa* are cultivated in gardens below the hills and are consumed by all classes. Hooker, *l. c.*, 343; Roxburgh, 529.

Canavalia ensiformis, D. C.—Bean—*Sem.* Consumed by all classes. Hooker, *l. c.*, II., 195; Roxburgh, 559.

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[1] For a botanical description of each plant see my 'Notes on the Economic Products of the North-Western Provinces,' Part V.

Apium graveolens. Linn.—Celery—*Saleri*. Grown for Europeans. Hooker, *l. c.*, II., 679 ; Roxburgh, 273.

Daucus Carota, Linn.—Carrot—*Gájar*. Hooker, *l. c.*, II., 718 ; Roxburgh, 270.

Lactuca sativa D. C.—Lettuce—*Kahu*. Roxburgh, 593.

Mentha viridis, Linn.—Spear mint—*Pahári-pudína*.

Salvia plebeia, R. Br.—Sage—*Salbia*. Drury (F. P.), II., 552.

Lycopersicum esculentum, Don.—Tomato—*Wiláyati baigan*. Roxburgh, 190.

Batatas edulis, Choisy.—Sweet potato—*Shakrkand*, *pindálu*. It is grown in the submontane tract and is a favourite with all classes. Drury (U. P.), 70 ; Roxburgh, 162.

Solanum esculentum. Linn.—Egg, plant—*Baigan* (Kumaun), *bhatta* (Garhwál). It is grown commonly by natives and Europeans. Drury (U P.), 409 ; Roxburgh, 190.

Solanum tuberosum, Linn.—Potato—*Alu*. The potato was introduced into Kumaun in 1843 by Major Welchman and now forms an important article of export. The seed is from time to time renewed by fresh importations.

Beta vulgaris, Linn.—Beet—*Chaukandar*. This root is chiefly grown in English gardens. Var. *bengalensis*, Roxburgh, 1, *pálang*, is cultivated as a pot-herb.

Dioscorea globosa, Roxburgh.—Yam—*Chúpri alu*. This yam is cultivated, whilst the following species found wild, furnish edible tubers :—

D. sagittata, Royle.—*Tair tarur*, the tubers lie 3-6 feet deep in the soil, edible.

D. quinata—*Magiya* or *muniya ;* white tubers, edible.

D. versicolor.—*Genthi*, *gajír*, *ganjíra ;* yields a deliciously fragrant yam, edible.

D. pentaphylla.—*Tegúna*, *takuli ;* tubers edible. Drury (F. P.), III., 276.

D. deltoides.—*Gun ;* on Siyáhi Devi.

Allium Cepa, Linn.—Onion—*Piyáj*. The onion is commonly cultivated, but is objected to by Brahmans and Baniyas in the plains from its having some fancied resemblance to flesh. Chives, leeks, and shallots are cultivated in European gardens.

Maranta arundinacea, Linn.—Arrow-root. This useful plant has been successfully cultivated by Mr. Fraser at Haldwáni in the Bhábar, and has yielded produce equalling the best West Indian.

Amorphophallus campanulatus, Blume.—*Zamín kand.* This sweet potato is grown in small quantities at the foot of the hills. It yields a large root stock, the size of a Swedish turnip, but flatter, and is the only one of the family that keeps well in the ground. It ripens too after the rest.

Colocasia antiquorum, Schott.—*Ghuiya*, *Ghwiya*; *arui* (plains). Cultivated along the foot of the hills.

Colocasia himalensis, Royle.—*Ghuiya* (plains), *pindálu* (white variety), *gaderi* (red variety), *pápar* (leaf), *guba* (unrolled leaf), all of which are edible. Other wild species are *Remusatia vivipara*, the *bágh-pindálu*, and *R. capillifera*, the *bánj-pindálu*; the former occurs 3-4,500 feet, and the latter 5-8,000 feet, flowering in June.

C.—SPICES AND CONDIMENTS.[1]

There is no country in the world, perhaps, where spices and condiments enter so largely into the food materials of the population. The man must be very poor indeed who cannot afford something of this kind with his daily meals. Much of the spices consumed are, however, imported, such as mace, cloves, black pepper, assafœtida, Ceylon cinnamon and nutmegs. The bark and leaves of *Cinnamomum Tamala* form an important flavouring material for curries, and the former is used generally as a substitute for true cinnamon. From the Himálaya, also we have turmeric, ginger, red pepper, cumin and cardamoms of excellent quality and divers wild herbs used as condiments.

The principal plants yielding spices or condiments cultivated or occurring wild in Kumaon are as follows:—

Papaver somniferum, Linn.—Poppy—*Khash-khash* (seeds). The seeds are used in curries; cultivated.

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[1] A full description of each will be found in my 'Notes on the Economic Products of the North-Western Provinces,' Part V.

Peucedanum graveolens, Benth.—Dill—*Soya.* The seeds are used in curries ; cultivated. Hooker, Fl. Ind., II., 709 ; Roxburgh, 272 ; Pharm. 101.

Murraya Kœnigii, Spreng.—*Gándla, gani* (Kumaun), *gandela* or *gúndi* (Bijnor). The leaves are used for flavouring curries ; the tree occurs wild in the lower hills and Bhábar. Hooker, *l. c.*, I., 503 ; Brandis, 48 ; Roxburgh, 362.

Carum Carui, Linn.—Caraway—*Jíra.* Cultivated for its seed in Garhwál, where it also occurs wild. Hooker, *l. c.*, II., 680 ; Pharm., 98.

Carum Roxburghianum, Benth—*Ajmúd.* Cultivated for its aromatic seeds, below the hills. Hooker, *l. c.*, 682 ; Roxburgh, 273.

Carum copticum, Benth.—Lovage—*Ajwáin.* Cultivated for its seeds below the hills. Hooker, *l. c.*, 682 ; Roxburgh, 357 ; Pharm., 99.

Coriandrum sativum, Linn.—Coriander—*Dhaniya.* Cultivavated for its seeds. Hooker, *l. c.*, 717 ; Roxburgh, 272.

Cuminum Cyminum, Linn.—Cumin—*Jíra.* Believed to be cultivated for its seeds below the hills (?). Hooker, *l. c.*, 717 ; Roxburgh, 271.

Fœniculum vulgare, Gœrtn.—Indian fennel—*Sonf.* Cultivated for its seed. Hooker, *l. c.*, 695 ; Roxburgh, 272.

Capsicum frutescens, Linn.—Red pepper—*Lál mircha, kursáni.* Cultivated for its fruit and exported. There are several species cultivated, for which see Roxburgh, 193.

Piper silvaticum, Linn.—Long pepper—*Pípala mor.*

Occurs wild in the valleys and the Bhábar and yields a substitute for the pepper of commerce. The average annual export from the Kumaun Forest Division is about 22 tons. Roxburgh, 52 ; Drury (U.P.), 131.

Cinnamomum Tamala, Var., *albiflorum*, Nees.—*Taj, jangli dálchini* (bark), *kikra, kirkiriya, tej-pát* (leaves).

A common shrub in Kumaun belonging to the natural order *Lauraceæ*, of which the bark and leaves are exported for culinary purposes and for use in medicinal preparations. The average annual export of the bark of this tree from the Kumaun forest division alone amounts to 25 tons, and of the leaves to 35 tons.

Curcuma longa, Roxb.—Turmeric—*Haldi, kachúr.*

This is the well-known *haldi,* so much used as a condiment. It is grown in large quantities in south-eastern Garhwál and Kumaun and in parts of Dehra Dún. It forms one of the most important and most profitable of exports from the lower hills, and is cultivated in jungles where nothing else can be profitably raised, as well as in the Dúns and Bhábar. It is singularly free from the attacks of wild animals. The tubers are planted in April-May, and the produce is gathered in November. Major Garstin has estimated the cost of cultivating one acre of turmeric at Rs. 36, of which one rupee goes for rent, Rs. 5 for sowing, Rs. 3 for planting out, Rs. 20 for seed, Rs. 4½ for weeding and hoeing, and Rs. 2½ for harvesting. An acre will produce thirty maunds of root worth Rs. 60, and when cured and dried, weighing about 7½ maunds, worth Rs. 75. Setting down the cost of curing and drying at Rs. 8, the average net profits on an acre of turmeric amounts to Rs. 31, and thus justifies its popularity amongst the hill cultivators. *C. angustifolia* is found wild.

Zingiber officinale, Ross.—Ginger—*Adu* (plant), *sonth* (green root), *adrak* (dried root).

Extensively grown in all hot valleys in Kumaun as an article of export. The mode of cultivation consists in first selecting a piece of ground not liable to be flooded and protecting it from excessive rainfall by digging a trench around the upper side. This is then well hoed and richly manured, and in Chait the ginger is planted out in trenches about half a foot deep with one foot space between each trench and between each plant. The earth is then heaped over the trenches and the whole covered over with leaves, which are kept in their places by bamboo or wooden poles. The poles are removed before the rains, but the leaves are not disturbed until the ginger crop is dug up and all the weeding is done by hand. *Z. elatum* (*kachúr*) is found wild in the Kota Dún and is a favourite food of the porcupine and wild hog. It is dug up in February all along the foot of the mountains and sent for sale to the plains, where it comes into use as a medicine.

Amomum subulatum, Roxb.—Cardamom—*Iláichi.* Cultivated in gardens for its fruit. Roxburgh, 15.

Allium sativum, Linn.—Garlic—*Lahsan.* Cultivated for its bulb.

Humulus Lupulus, Linn.—Hop. The hop flowers well at Háwalbágh, though not so successful as in the west: introduced.

D.—GREENS.[1]

The vegetable products used as greens may be conveniently divided into three classes :—

1. Plants specially cultivated for food as greens, such as the cabbage, *pálaks*, &c.
2. Products collected from plants cultivated for other purposes, such as the mustard and gram.
3. Uncultivated products used as food.

Greens are prepared for food in much water and are then pressed to get rid of the excess moisture and are seasoned with spices and clarified butter and in this form are called *ság.* When cooked in a moderate quantity of water, which leaves them crisp and dry, they are called *bhangiya.* In either form they are, as a rule, insipid and utterly unpalatable to European tastes. They are seldom eaten alone and are usually combined with cereals, pulses or other vegetables.

1.—*Plants specially cultivated as greens.*

Brassica oleracea, Linn.—The cabbage.—*Gobi.* Its cultivated varieties, the cauliflower (*phúl-gobi*), white-cabbage, Savoy, Brussels' sprouts, borecole, broccoli, and knol-kohl are all cultivated in English gardens and are gradually spreading amongst the natives. Hooker, Fl. Ind., I., 156.

Brassica juncea, H. *f et* T.—Mustard—*Rái, sarson.* The variety *S. ramosa,* Roxb., is the *banlái* of Kumaun, and the variety *S. rugosa,* Roxb., is the *bádsháhi-lái* and *bhotiya-lái* of Kumaun, introduced by the Gorkhális from Nepál. Both of these are cultivated and highly valued as a vegetable. Hooker, *l.c.*, 157.

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[1] Full description of all these plants will be found in my 'Notes on the Economic Products of the North-Western Provinces,' Part V., Allahabad, 1881.

Eruca sativa, Lam., is the *dúa* and *chára* of Kumaun. Cultivated as a fodder and for the oil expressed from its seeds. Hooker, *l. c.*, 158.

Nasturtium officinale, Brown.—Water-cress—*Piriya-hálim.* It occurs cultivated and wild in the Kota and Dehra Dún. Hooker, *l. c.*, II., 133.

Lepidium sativum, Linn.—Cress—*Hálim hálang* (Garhwál). Commonly cultivated as a relish. Hooker, *l. c.*, I., 159.

Trigonella Fænum-græcum, Linn.—Fenugreek—*Methi.* Cultivated; cooked either alone as a relish or with unleavened bread (*roti*). Hooker, Fl. Ind., II., 87.

Oxalis corniculata, Linn.—*Chalmori.* Occasionally cultivated, usually wild; used as a salad. Hooker, *l. c.*, I., 436.

Portulaca oleracea, Linn.—Small purslain—*Lúnak.* Cultivated everywhere. Green leaves cooked or eaten as a salad. Hooker, *l. c.*, I., 246.

Amaranthus Blitum, Linn.—*Chaulái.* This and other species of amaranth, such as *A. gangeticus* and its variety *A. oleraceus,* are chiefly used as pot-herbs. Roxburgh, 641.

Ocimum Basilicum, Linn.—Sweet basil—*Káli túlsi.* Cultivated as a flavouring pot-herb. Roxburgh, 463.

Chenopodium album, Linn.—*Bethuwa, charái.* This and *C. viride* are used as greens and are very popular.

Phytolacca acinosa, Roxb.—*Jirrag.* Cultivated up to 10,000 feet for its leaves, which are used as greens. Roxburgh, 389.

Basella rubra, Willd.—*Pái.* Cultivated as greens. Roxburgh, 275.

Rumex vesicarius, Linn.—*Chúka-pálang.* Cultivated in beds near wells. Roxburgh, 399.

Perilla ocimoides, Linn.—*Bhangara.* Cultivated both for its leaves and for the culinary oil expressed from the seeds.

2.—*Products collected from plants cultivated for other purposes.*

Under this head the following may be briefly noticed. The leaves of the coriander, *Coriandrum sativum.*, Linn, the *dhaniya* of he hills and plains, are collected as greens, the plant itself being cultivated for its aromatic seeds. Similarly the leaves of the gram plant, *Cicer arietinum*, Linn., and buckwheat are used as a spinach, as well as those of the safflower, *Carthamus tinctorius*, Linn. The leaves of most of the pulses, such as *lobiya*, *sem*, &c., grown for their seeds, are eaten; also of *Brassica campestris* and *Perilla ocimoides*, cultivated for their oil-seeds; of the different species of *Arum* grown for their tubers, and of *Hibiscus cannabinus*, Linn., cultivated for its fibre. In times of scarcity there are few products of the vegetable kingdom which are not absolutely hurtful that do not afford some aid to the poor man's table. The next section gives a long list of those wild fruits, berries, and leaves that are thus brought under requisition, whilst the number of trees whose foliage affords fodder for cattle when the drought dries up the grass is hardly smaller. The value of the forests, therefore, in times of scarcity is considerable, and it is then that the hungry pour into them from every district in the plains, and try to eke out a miserable existence by collecting these berries and leaves.

E.—FRUITS, CULTIVATED AND WILD.

The cultivated fruits of the Kumaun division include the peach, apricot, plum, damson, cherry, apple, pear, quince, medlar, orange, lemon, lime, citron, walnut, mango, guava, plantain, pomegranate, fig, strawberry, and mulberry: a goodly list, but varying muchni quality. Most of the European fruit trees have been introduced and distributed from the plantations formed in recent years at Mussooree, Chhajauri, Páori, Háwalbágh, and Ránikhet. Amongst the wild fruits may be noticed the gooseberry, red and black currant, blackberry, hazel-nut, raspberry, strawberry, figs, pears, apples, and walnuts, none of which are of much value. Wild rhubarb of the red species grows in large quantities in the upper ranges above 9,000 feet and is of good flavour. In the following section will be found a short notice of the more valuable species and a list of the wild fruits that are commonly regarded as edible and in some respects afford a food resource, especially in seasons of scarcity. In each case a reference is given to a full botanical description from which the tree or plant may be recognized.

Citrus medica, Linn.—Citron. Brandis, p. 50.

Brandis refers the citron, lime, and lemon as varieties of this species.

I.—*medica* proper—Citron. To this belongs the wild varieties known as *bijaura* and *karan-phal* found in the Bhúbar and along the Sarju under Gangoli Hát in Kumaun. The wild varieties are used for pickling and the dried rind is made into a preserve. The cultivated variety yields the well-known citron preserve; and to it belongs the *madkakari* of Garhwál.

II.—*Limonum*—Lemon. Madden refers to this variety the *jámíra* found wild in the Kota Dún of Kumaun, and Royle notes one called *pahári-nímbu* or *pahári-kághazi* as wild in the Dehra Dún and the north-western Himálaya. Madden states that the lemons produced in and around Almora in the cold season and allowed to mature in straw are of excellent quality.

III.—*acida*—Sour-lime. This includes the *níbu* and its cultivated varieties, the *kághazi*, &c. They are much employed for sherbets and the like and thrive well in the warm valleys.

IV.—*Limetta.*—Sweet-lime. This variety is cultivated in suitable localities in Kumaun under the names *amrit-phal*, *mítha-níbu*. It ripens as far north as the valley of the Sarju near Bágeswar and is much used for sherbets. The dried rind is in request as a flavouring agent.

Citrus decumana, Linn.—Shaddock, pumelo. Brandis, p. 55. This species was introduced into India from Java and is now completely naturalised, ripening in the hills as far as Háwalbágh, near Almora, under the names *sadáphal*, *mahá-níbu*. It is a great favourite with all classes and gives fruit all the year round, so that on one tree may be seen the flower and ripe and unripe fruit at the same time.

Citrus aurantium, Linn., includes the bitter or Seville orange, the sweet orange and the bergamot. Brandis, p. 50. Of these three varieties the sweet orange is the form most commonly cultivated. There are several local varieties, some named after the localities in which they are produced and others according to specific distinctions in size or flavour. The *kaunla* is the smallest and most esteemed, and of it the best cultivated varieties are found in the warm valleys of eastern Kumaun. Oranges are now cultivated generally throughout the hills up to 5,500 feet and some excellent varieties thrive at Bamti in Garhwál. The orange has been found wild or apparently wild with unwinged petioles at Bágeswar in Kumaun (Str. and W.) and with globose fruit, naked or margined petioles and oblong-lanceolate, acuminate leaves in Garhwál (T. T.)

Vitis vinifera, Linn.—The vine. Brandis, 98. The fruit is called *dákhang* in Kunáor, where it flourishes; but it can be raised in Kumaun, where the rains are not too heavy. The vines and apricots of Kunáor are much praised in the Puránas.

Mangifera indica, Linn.—Mango—*Am.* Hooker, II., 14. The mango is said to occur wild in the sub-Himálayan tract from Kumaun to Sikkim, but it is also cultivated in the Dúns. The mango groves of the Kota Dún have more than a local repute.

Prunus Amygdalus, Baill.—Almond—*Badám.* Hooker, II., 312. A few trees are cultivated in Kumaun, introduced probably by Aoghání workmen.

Prunus persica, B. et H. *f.*—Peach—*Aru, rek.* Hooker, II., 313. The usual English varieties have been imported and thrive well in suitable localities. The Kábuli peach is completely naturalised in the north-western Himálaya and in places appears to grow wild. Brandis has some observations (p. 191) on its distribution, and notes that the blossom is apt to be killed by excessive frost and that a small green beetle, at times, strips the tree of its leaves. Madden states that at Almora the fruit does not ripen well nor does it ripen at Naini Tál, but in the Dehra Dún and the warmer valleys it comes to perfection and bears well. The flowers appear in January-May, and the fruit ripens in May-October, according to locality.

Prunus Armeniaca, Linn.—Apricot—*Chúáru, chola, zard-álu, jald-áru, kushm-áru,* the *galdam* of Tibet. Hooker, II., 313.

The apricot is commonly cultivated all over the hills, especially to the west, in the valleys of the Jumna and Tons, where it affords a very important local food resource and an article of export. An oil is there extracted from the kernels and is used in medicine and for perfumery purposes for the hair and for burning. This oil is clear, of a pale yellow colour and smells strongly of hydrocyanic acid, of which it often contains four parts in 100. Several European varieties have been introduced and distributed through the Ránikhet nad

Mussooree nurseries. The flowers appear in January-May, according to elevation, and the fruit ripens in May-September.

Prunus Avium, Linn.—Sweet cherry or gean—*Gilás.* Hooker, II., 313. Brandis unites this and the following and Hooker keeps them separate. This species is cultivated to the west up to 8,000 feet. It flowers in April-May and the fruit ripens in June. The European varieties introduced have not succeeded in these hills, owing to the effect of the heavy rain on the young fruit.

Prunus Cerasus, Linn.—Acid cherry—*Alu-bhálu.* Hooker, II. 313. Cultivated up to 7,000 feet. Several varieties from European stock have been introduced and thrive where the rain is not excessive. It flowers and fruits at the same time as the preceding.

Prunus Puddum, Roxb.—Wild cherry—*Púya, paiya, padam, paddam.* Hooker, II., 315. Common, both wild and half cultivated all over the hills of these provinces. The fruit, though very bitter, is eaten by the natives and is collected for Europeans to make the well-known hill cherry brandy. The flowers appear in October-November and the fruit ripens in spring.

Prunus communis, Huds.—Yellow bullace—*Alu-bukhára* (blue), *alecha, alúcha* (yellow), *chhota álu* (small variety). Hooker, II., 315. Madden notes two cultivated varieties at Almóra; one a dark-blue damson known as *bhotiya-baddm*, and the other a larger orange red variety called *ladák*. The first ripens in July and the second in June, and both may probably be referred to *P. communis*, var. *domestica*, plum or prune. Madden styles them "palatable, but unwholesome." Brandis unites (p. 192) under this species the sloe and the different kinds of plums, damsons, and prunes. Many European varieties have been introduced with more or less success.

Prunus Padus, Linn.—Bird-cherry—*Jámana.* Hooker, II., 316. This species occurs wild 4,000 to 10,000 feet. The fruit, though insipid and somewhat astringent, is eaten by the natives and may be used in the manufacture of liqueurs. The flowers appear in the hot season, the fruit in the rains. Other wild species are (1) *P. nepalensis*, Ser., which differs from *P. Padus* by having the fruit twice as large with a quite smooth, thick-walled stone. (2) *P. Jacquemontii*, Hook. *f.*, recorded from the Dhauli valley in Garhwál.

(3) *P. undulata*, Ham., which occurs from the Jumna to Bhután at 6,500-8,000 feet, but none of them have any economical value.

Fragaria vesca, Linn.—Strawberry. Hooker, II., 343. The strawberry grows very well in the hills at Mussooree, Binsar, Ránikhet, Naini Tál, and on most tea plantations. Imported stocks also thrive, and indeed experience shows that the local stock should be renewed every three years and, when possible, from cuttings from other gardens. The wild strawberries (*Fragaria indica*, Andr.—*Kípaliya*, *bhyúla* and *F. Vesca*, var. *nubicola*) yield abundantly a palatable fruit, which, however, can be wonderfully improved by cultivation. The fruit of the cultivated species ripens in the hills during April-May.

Cydonia vulgaris, Pers.—Quince—*Bihi.* Hooker, II., 368. The quince is cultivated in the hills up to 5,500 feet and is eaten fresh, candied, dried or in tarts. The fruit ripens June-July. Several European varieties have been introduced through the public nurseries and by private growers.

Pyrus communis, Linn.—Pear—*Náspati, nák.* Hooker, II., 374. The pear is cultivated for its fruit throughout the hills 2-8,500 feet. Most of the European varieties flourish in Kumaun, and pears of excellent quality from Jalna near Almora and other gardens are now procurable in the Naini Tál market. The tree flowers in the spring and the fruit ripens during the rains.

Pyrus Pashia, Ham.—*Mehal, mol.* Hooker, II., 374. This species occurs wild everywhere in the hills 2,500-8,000 feet. The fruit is hard, bitter and worthless, and is only eatable when half-rotten. The stocks are good for grafting. The flowers appear in the spring and the fruit ripens in September-December.

Pyrus Malus, Linn.—Apple—*Seb, seo.* Hooker, II., 373. The apple occurs wild in the hills 5,000-9,000 feet and is also cultivated. The flowers appear in the spring and the fruit ripens July-September. Much has been done of late years to promote pomiculture by the distribution of grafts of introduced species from the public nurseries. Apples of all varieties are now found in the markets of excellent quality and at a reasonable price.

Pyrus baccata, Linn.—Siberian crab—*Ban-mehal, gwála-mehal.* Hooker, II., 373. This species occurs wild 6-11,000 feet.

The fruit is small and sour, but is much prized by the natives. H. Strachey found it at Kunti in Byáns of Kumaun bearing a very small red crab no bigger than a wild cherry and worthless to eat. The flowers appear in spring and the fruit ripens towards the end of the rains.

Pyrus lanata, Don.—*Galion, mehali, pattu, ban-patti.* Hooker, II., 375. This species is also wild and is not uncommon 5-10,000 feet. Like the fruit of *P. Pashia*, the fruit of this tree is only eatable when half-rotten. The flowers appear in April-May and the fruit ripens in August-October. There are several other wild species occurring in Kumaun, such as (1) *P. kumauni*, Decaisne, 5-8,000 feet; (2) *P. vestita*, Wall., known as *mauli* and one of the best (sweetest) wild fruits; and (3) *P. foliolosa*, Wall., known as *húliya-súliya.* None of these, except *P. vestita*, yield a fruit of any value, nor is it recorded whether the stocks can be utilised for grafting. All have been described by Hooker.

Ribes Grossularia, Linn.—Gooseberry—*Lepcha, galdam* (Byáns), *sirgochi* (Juhár). Hooker, II., 410. The wild gooseberry occurs in the dry parts of the inner Himálaya, 8-11,500 feet. The flowers appear in spring and the fruit ripens in September-October. It has a sour taste and is small and not eatable. H. Strachey records having found it at Tála-káwa in Byáns in September and pronounces it worthless. The European cultivated varieties have been introduced, but do not thrive nor bear freely.

Ribes glaciale, Wall.—Black and red currant—*Kukuliya, kala-káliya mángle* (Byáns), the red variety; *durbui, dongole* (Byáns), the black variety. Hooker, II., 410. The red variety occurs rarely, but the black is frequent above 10,000 feet in Kumaun. The latter is the *R. acuminatum* of Wallich. Both yield a sour, unpalatable fruit of no value. H. Strachey found it near Nabhi in Byáns, where it is very abundant and yields a fruit described by him as "small and insipid." The flowers appear in May and the fruit ripens in September-October.

Ribes nigrum, Linn.—Black currant.—*Pápar.* Hooker, II., 411. This species occurs towards the heads of the Tons and Jumna and in Kumaun on the northern slopes of Rigari-Gudari (G.) over 10,000 feet. The flowers appear in July and the fruit ripens in

August-September. Major Garstin states that the fruit is quite as large and as palatable as the cultivated variety.

Ribes rubrum, Linn.—Red currant—*Pápar*. Hooker, II., 411. This species occurs in both moist and arid tracts along the inner Himálaya, 5,000-12,000 feet. Brandis notes that in Lahúl there are specimens with a deep campanulate calyx, the lobes of which are ciliate and the fruit (*niangha*) is yellow when unripe, but black when ripe with the taste of red currants. This fruit is altogether better than that of *R. glaciale* above, though small and more acid than is agreeable. The cultivated red, white, and black currants have been introduced from Europe, but do not appear to succeed in the Kumaun climate.

Punica Granatum, Linn.—Pomegranate—*Anár dárim* (tree and fruit), *náshphál, kushiála, post-anár* (rind). Hooker, II., 580. The pomegranate occurs wild all over the hills. The flowers (red or yellow) appear in April-May and the fruit ripens in July-September. There are several varieties cultivated, the flowering pomegranate and those with sweet or acid fruit, but those raised from Afghánistán stocks are preferred. The fruit is sub-acid and pleasant to the taste and allays thirst. The bark is largely exported for tanning.

Bassia butyracea, Roxb.—Butter-tree—*Chiúra, chyúra;* the butter is called *chyúra-ka-pina* in Almora and *phalel* and *phulwára* in the plains. Brandis, 290; As. Res., VIII., 477. This fine tree occurs along the outer ranges 1,500-4,000 feet. The flowers appear from November to January, and the honey produced by the bees that feed on them is esteemed above all others in Kumaun. Madden records its occurrence on the Kamolaghát leading to the Kota Dún. In Sor, it is abundant in the Pithoragarh valley, reaching the size of a large tree as high up as Kanthagaon (4,000 feet), and it occurs in abundance in the Káli valley on both the Kumaun and Nepál sides, from Askot to Punagiri, near Barmdeo. The sweet insipid pulp of the fruit is eaten and the cake left after the oil has been extracted is eatable. From the seeds a soft solid vegetable butter is extracted of the consistence of fine lard and of a delicate white colour, which does not melt in the heat of the plains and keeps a long time without deteriorating. It melts completely at 120°F., and is used as a cold-cream and lip-salve. Pharm., 131.

Corylus Colurna, Linn—Hazel—*Kapási, Bhotiya-badám.* The hazel occurs wild 5,000-10,000 feet to the west of the Ganges and in one strip of jungle in Painkhanda, nine miles north-east of Joshimath and in a few other places in Garhwál. The flowers appear in March-April and the fruit ripens in the rains. The kernels of the fruit are eaten and in some places are as good as English hazel-nuts. The trees bear every third year and yield a crop sufficient for export to the plains.

Juglans regia, Linn.—Walnut—*Akhrot, kharot, ák.* Brandis, 497. This tree occurs wild and planted throughout the hills. The fruit ripens in July-September and numbers several varieties, the best being the thin-shelled or *kághazi-akhrot.* The better sorts appear to be more common to the west of the Ganges. An oil used for burning and culinary purposes is expressed from the kernels of both the wild and cultivated varieties.

A mere list of the remaining trees, cultivated and wild, that afford edible products will be sufficient. A description of each tree will be found in Part V. of my 'Notes on the Economic Products of the North-Western Provinces.'

Scientific name.	Vernacular name.	Reference.	Portions edible.
Dillenia indica ...	*Chalta, chalita* ...	Hooker, I., 36 ...	Buds, calyx, leaves and fruit.
Anona squamosa ...	*Behe* ...	„ 78 ..	Fruit (Barmdeo), wild.
Berberis asiatica ...	*Kilmora* ..	„ 110 ...	Fruit: other species also eaten.
„ aristata ...	*Chotra nachi-shin* (Bhot).	„ 110 ...	Fruit often dried like raisins.
Capparis spinosa ...	*Ulta-kánta* ...	„ 173 ...	Flower-buds pickled as capers; fruit.
Flacourtia Ramontchi.	*Kandi, Kundai* ...	„ 193 ...	Fruit.
Flacourtia sepiaria .	...	„ 194 ...	Fruit.
Saurauja nepalensis,	*Gogina, gogána* ...	„ 286 ..	Do.
Bombax malabaricum.	*Semal* ...	„ 349 ...	Calyx of flower-buds.
Sterculia urens ...	...	„ 356 ...	Roasted seeds.
Grewia asiatica ...	*Dháman, pharsiya* ...	„ 387 ...	Palatable sub-acid fruit.
„ oppositifolia,	*Bhengúl* ...	„ 384 ...	Ditto.
„ scabrophylla,	*Gúr-bheli* ...	„ 387 ...	Ditto.
Elæocarpus Varunua.	*Jalpai* ...	„ 407 ...	Fruit: very rare.

Scientific name.	Vernacular name.	Reference.	Portions edible.
Glycosmis pentaphylla.	*Ban-nimbu pilru, potala.*	Hooker, I., 499	Fruit: very rare in Bhábar.
Limonia acidissima,	*Beli*	„ 507	Pulp of fruit in sherbet: wild.
Feronia Elephantum.	*Kait, kath bel*	„ 516	Fruit: cultivated and wild.
Ægle Marmelos	*Bel, sriphala*	„ 517	Ditto: ditto.
Garuga pinnata	*Kumira, kharpat*	„ 529	Fleshy black drupe.
Zizyphus Jujuba	*Ber, bera*	„ 632	Fruit: cultivated.
„ vulgaris	*Kundiári, kúl phal, khalis, beri.*	„ 634	Ditto: cultivated and wild.
„ Œnoplia	*Mako, bumolan*	„ 634	Ditto: wild.
„ oxyphylla	*Gigar*	„ 634	Ditto: do.
Hovenia dulcis	...	„ 640	Ditto: cultivated and wild.
Sageretia oppositifolia.	*Aglaia*	„ 641	Black, succulent fruit.
Vitis lanata	*Asaujiya, pahár-phúla, purain.*	„ 651	Fruit.
Æsculus indica	*Pánkar*	„ 675	Seeds steeped and ground.
Pistacia integerrima,	*Káhra-singi* (fruit)	Hooker, II., 13	Fruit.
Semecarpus Anacardium	*Bhiláwa, bhela*	„ 31	Fleshy receptacle around seeds.
Buchanania latifolia,	*Piyál, múriya, kath-bhiláwa.*	„ 23	Kernels of the fruit.
Spondias mangifera,	*Amra, bahamb, amára,*	„ 42	Fruit.
Moringa pterygosperma.	*Sahajna, sehjna*	„ 45	Bark, leaves, flowers, pods.
Bauhinia malabarica,	*Amli*	„ 277	Leaves.
„ variegata,	*Kachnár, khairwál, bariál,*	„ 284	Ditto and flower-buds.
„ purpurea	*Kaniyár, kandan, gúriál.*	„ 284	Flower-buds.
„ Vahlii	*Máljan, mála*	„ 279	Seeds.
Tamarindus indica	*Imli*	„ 273	Fruit: cultivated.
Cassia Fistula	*Kitwáli, kitola, itola,*	„ 261	Young pods.
Prinsepia utilis	*Bhekara, dhatela, jhatela.*	„ 322	Oil of seeds.
Rubus lanatus	*Hisálu*	„ 331	Fruit.
„ paniculatus	*Kála-hisálu, anchu, patharola.*	„ 329	Black fruit.
„ moluccanus	*Katsol, hisálu*	„ 330	Red fruit.
„ niveus	*Píla-hisálu*	„ 335	Brownish-yellow fruit common.
„ lasiocarpus	*Hisálu, kála,* and *lál*	„ 339	Red and black fruit; common.
„ ellipticus	*Gauri-phal, jogiya-hisálu.*	„ 336	Yellow fruit, common.
„ nutans	*Langur, sinjang* (Bhot).	„ 334	Red fruit.
Terminalia bellerica,	*Bahera*	„ 445	Kernels of fruit.
Eugenia operculata,	*Rái-jáman*	„ 498	Fruit.
Alangium Lamarckii,	*Akola, ghaul*	„ 741	Do.
Cornus macrophylla,	*Kágshi, rúchiya*	„ 744	Do.
„ capitata	*Bamaura*	„ 744	Do.

Scientific name.	Vernacular name.	Reference.	Portions edible.
Lonicera angustifolia.	*Geang* (Jaunsár)	Hooker, III., 13	Fruit.
Viburnum stellulatum.	*Lál tít-maliya*	,, 4	Do.
Anthocephalus Cadamba.	*Kadam*	,, 23	Do.: cultivated.
Randia uliginosa	*Pindáru*	,, 110	Do.
,, dumetorum,	*Mainphal, manyúl*	,, 110	Do.
Mæsa argentea	*Phasera, gogsa*	Brandis, 283	Do.
Orthanthera viminea,	*Chapkiya*	,, 334	Flower-buds.
Cordia Myxa	*Bairala, baurala*	,, 336	Fruit.
,, vestita	*Pín, kúm*	,, 338	Do.
Ehretia serrata	*Púna, punden.*	,, 339	Do.
,, lævis	*Chamror*	,, 340	Do.
Hippophaë rhamnoides.	*Dhúr-chuk, tarwachuk.*	,, 388	Do.
Elæagnus latifolia,	*Ghiwai, mijhaula*	,, 390	Do.
Morus indica	*Tút túert*	,, 408	Do.
,, serrata	*Kimu, himu*	,, 409	Do.
,, lævigata	*Sháh-tút, siyáh-tút*	,, 409	Do.
,, multicaulis	...	...	Leaves for silk-worms.
,, chinensis	...	...	Do.
Ficus Carica	*Anjír*	,, 418	Fruit.
,, macrophylla	*Timla*	Roxburgh, 645	Do.
,, virgata	*Beru*	Brandis, 419	Do.
,, Cunia	*Kunia, kuinau*	,, 421	Do.
,, glomerata	*Gúlar, panwa, lelka*	,, 422	Do.
Artocarpus Lakoocha,	*Dahu, barhal*	,, 426	Do. and male flower heads.
Celtis australis	*Kharak*	,, 428	Fruit.
Antidesma diandrum,	*Amli, sarshoti, sarsheti.*	,, 447	Do.
Briedelia retusa	*Gauli*	,, 449	Do.
Phyllanthus Emblica,	*Aonla, amla, amlika*	,, 454	Do.
Securinega obovata,	*Gwála-dárim, dháni*	,, 455	Do.
Myrica sapida	*Káiphal*	,, 495	Do.
Ephedra vulgaris	*Khana*	,, 501	Do.
Musa sapientum	*Kela*	Roxburgh, 223	Do., wild and cultivated.
Dendrocalamus strictus.	*Báns*	Brandis, 564	Tender shoots.

F.—PARTS OF WILD PLANTS USED AS FOOD IN THE HILLS OR SUBMONTANE TRACT.

The following list[1] gives some of the wild plants of which parts are used for food in seasons of scarcity. Some of them, such as the lotus, yams, and wild millets, are always eaten by the poorer classes :—

Scientific name.	Vernacular name.	Reference.	Parts edible.
Nelumbium speciosum.	*Kanwal, padam, ambaj.*	Hooker, I., 116...	Stalk, leaves, and roots.
Triumfetta rhomboidea.	*Manphora, jhinjhru* ..	„ 395...	Leaves and seeds.
„ pilosa ...	*Leshwa-kumariya* ...	„ 394...	Ditto.
Tribulus terrestris ...	*Gokhru* ...	„ 423...	Leaves and fruit.
Leea aspera ...	*Kumali, kurmáli*	„ 666 .	Fruit.
Pueraria tuberosa ...	*Bilái-kund, birdli-púna, sarál* (Jaunsár).	Hooker, II., 197...	Tuberous roots.
Flemingia congesta,	*Mus-kela* ...	„ 229...	Pods.
Cassia Tora	*Bandr panwár* ..	„ 263...	Leaves and stems.
Trianthema monogyna.	*Bishkhapra* ..	„ 660...	Ditto.
Hydrocotyle asiatica.	*Thalkari* ..	„ 669...	Leaves.
Ipomœa sessiliflora,	*Haran-khúri, hara* ..	Roxburgh, 159...	Ditto and stems.
Solanum verbascifolium.	*Aseda* ...	„ 189...	Fruit.
Celosia argentea ...	*Sirdli, ghogiya* ...	„ 228...	Leaves and stems.
Digera arvensis ...	*Das* ..	Drury, III., 29...	Ditto.
Euphorbia angustifolia.	*Dúdhila-ghás, mahábir.*	„ 120...	Seeds.
Urtica parviflora ...	*Berain, shishona* ..	Roxburgh, 654...	Leaves.
Aloe vulgaris ...	*Guikwár* ...	Drury (U.P.)27...	Seeds and leaf pulp.
Commelyna obliqua,	*Kána, kanjura* ..	Drury (F.P.)III., 310 ...	Leaves and stems.
Dioscorea sagittata,	*Tair, tarár* ..	Royle ...	Roots.
„ versicolor,	*Genthi, githi gajir, ghanjin.*	Drury (F.P.)III., 277 ...	Do.
„ pentaphylla	*Tagúna, tákuli* ...	„ 276.	
„ quinata ...	*Magiya, muniya* ...	...	Do.
„ deltoidea ...	*Gún* ...	...	Do.
„ aculeata ...	*Man-álu* ...	276 ...	Do.
Oplismenus colonus,	*Suan, jangli-mandira,*	„ 570 ...	Seeds.
Saccharum Sara ..	*Sarhar sarár* ...	Roxburgh, 82 ...	Do. in Bhábar.
Scirpus Kysoor ..	*Kaseru* ...	„ 77 ...	Roots.
Asplenium polypodioides.	*Lingura* ...	...	Fronds.
Nephrodium odoratum.	*Kutra* ...	...	Do.

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[1] Descriptions of all these plants will be found in Part V. of my 'Notes on the Economic Products of the North-Western Provinces,' Allahabad, 1881.

II.—VEGETABLE SUBSTANCES USED IN MEDICINE OR FOR INTOXICATION.

A.—DRUGS. B.—NARCOTICS AND SPIRIT.

A.—DRUGS.

My object in the following list of the vegetable drugs found and used in or exported from the Himálayan districts of these Provinces is to give a reference to a work where each one is botanically described and also to a work where their medicinal properties have been noticed.[1] It would be out of place here to do more than briefly indicate the therapeutic virtues attributed to them by European and Native practitioners. The following remarks[2] of Dr. Burton Brown on the vegetable drugs collected for the Lahore Exhibition will form a fitting introduction to this section of our subject:—

"The medicinal use of preparations of vegetable drugs has been for a long time of the greatest importance, and until a comparatively recent period the number of drugs obtained from plants and animals greatly exceeded that of preparations from the mineral kingdom. This depended on the fact that until chemical knowledge was fixed on a firm basis, it was only with great difficulty and after many failures that chemical products could possibly be obtained; while, on the other hand, the different parts of plants to which a medicinal use was assigned were easily distinguished and procured without much trouble. In Europe, owing to the progress of science, mineral preparations are now most extensively made and used for medicinal purposes, and many of our most valuable drugs are derived from this kingdom. But in India the knowledge of chemistry is confined to those among the natives who have been instructed by Europeans, and therefore medicinal substances procured from the mineral kingdom are comparatively seldom made or used, excepting by those who have been so taught; or those mineral articles are used which are procurable without much skill in preparation and are often of little efficacy. The use of vegetable drugs would probably be the first to recommend itself to those seeking relief from pain and disease, because plants are everywhere at hand, their number is very great, and their forms are distinctive and often peculiar, and in some cases they have been supposed to bear a more or less obscure resemblance to certain parts of the body, either in health or when diseased. Thus, in olden times, we find in Homer that Nestor used a poultice of onions, cheese, and meal, mixed with wine, to Machaon's wound ; and the former substance was used by the ancient Egyptians in cases of dropsy. The hellebore of Anticyra was long extolled by the Greek writers, and is said to have been used by Melampus of Argos to cure the daughter of king Proclus of melancholy. It has also been supposed that opium was the *Nepenthe* of Homer.

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[1] A full description of each plant or tree and a more detailed noticeof uses of each drug will be found in my "Notes on the Economic Products of the North-Western Provinces," Part VII.

[2] Panj. Products.

" Enough has been adduced to prove the antiquity of those simples or Galenical preparations as medicinal drugs derived from the vegetable kingdom, and it is well next to consider in what manner the use of drugs was probably commenced. The use of each vegetable preparation was, probably, at first brought about by the experience of individuals, each of whom had found that certain plants were useful in the diseases which afflicted himself or his neighbours, and this knowledge was more rapidly spread owing to the ancient custom of placing the sick in public roads and markets, so that passers-by might communicate information respecting such remedies as were employed in similar cases. As observed by Herodotus, in this way a knowledge of a great number of medicines would be acquired, at first chiefly of those which were indigenous to the country, but gradually the drugs of other countries would become known, especially those which were found to be of undoubted efficacy in the disease for which they are used.

Hence it is to be expected that there will be found a larger number of substances, which are inert or nearly so in a Materia Medica which comprises indigenous plants only, than in a collection of drugs brought from a distance. Moreover, as the imported drugs must always be more costly than the indigenous ones, there will always be a tendency to substitute some indigenous substance which may resemble the foreign one in appearance or action, especially as the description of the drugs or of the plants from which they are derived was formerly much less carefully attended to than now. Thus it will be seen, as above stated, that an Indian plant, *Picrorhiza Kurrooa*, has been substituted for the more remote hellebore of the Greek physicians. Similarly a kind of *Valerian* takes the place of *Asarabacca*, and fruits of *Gardenia* that of the juniper. This substitution would certainly bring the kind of remedy in which it was employed into disrepute, as the substance used for adulteration would differ greatly from the original drug in its powers and mode of action.

"Besides the above modes of ascertaining the natures of remedies, which, being founded on actual experience, must be termed improved methods, there is another mode called the *Doctrine of signatures.* This is founded on the belief that every natural substance possessed of medicinal virtues indicates by its external character the disease for which it should be employed. Thus turmeric, rhubarb, and other roots, which have a brilliant yellow colour, were supposed to be specially useful in jaundice and diseases of the liver. *Cassia fistula* (*amaltás*), from the peculiar septa of the fruit resembling the valves of the intestines, is supposed to be especially destined for the cure of diseases of those organs; and similarly, poppies, from the shape of their capsule, were supposed to be useful in diseases of the head; and roses, from the colour of their petals, in those of the blood. Many small red or yellow seeds, especially those of cruciferous plants, were supposed to be useful in cases of gravel, the deposit of which they sometimes resemble in appearance; and *sálap misri* is used in diseases of that organ to which the name of *Orchis* (applied usually to the plant) is assigned. The convoluted pod of the *Helicteres Isora* is employed in colic, since it is supposed to resemble the twisting of the coils of the intestines. But although it is probable that the use of different drugs was commenced in some of the ways already spoken of, yet at the present day the native physicians have adopted, with some modifications, the idea of GALEN respecting the method of operation of medicines: this was, that the uses of all medicines were derived from their elementary or cardinal properties—namely, heat, cold, moisture, and dryness; and that all diseases could also be classed under the above heads, but that in the treatment of disease a medicine should always be employed which was of a contrary nature to the disease treated. Thus a cold disease requires a hot remedy and the converse. It is probable that ignorance of the attachment to this theory (which is well known to native patients and *hakíms*) is often an obstacle to the employment of European medicines in the hands of European practitioners among natives, as either a remedy which they consider hot is employed for a disease which is also considered hot, or the prescriber does not state whether the remedy given is a hot or cold one even when asked. Although the theory that medicine acts by being hot or cold only is entirely erroneous, yet it has so strong a hold on the confidence of many natives that, without some attention to it, it would be difficult in many cases to induce them to take the medicine ordered.

"The following is a list of some of the drugs employed, showing their nature according to native ideas, and also their real use in European medicine :—

Scientific name.	Vernacular name.	Reference.[1]	Real use.
	Cold medicines.		
Phyllanthus Emblica, Linn.	**Aonla, amlika** ..	**Brandis, 454** ...	**Astringent and acid purgative.**
Rosa centifolia, Linn.	**Gúl-surkh** ...	**" 200** ...	**Astringent and purgative.**
Rosa alba, Linn. ...	**Gúl-seoti** ...	**" 200** ...	**Astringent.**
Citrus Aurantium, Linn.	**Nárangi** ...	**" 53** ...	**Astingent, tonic.**
Tamarindus indica, Linn.	**Imli** ...	**" 163** ...	**Refrigerant.**
Terminalia Chebula, Retz.	**Harera** ...	**" 223** ...	**Astringent.**
Rhus Coriaria, Linn.,	**Samák** ...	**" 120** ...	**Ditto.**
	Hot medicines.		
Semecarpus Anacardium, Linn.	**Bhiláwa** ...	**Brandis, 124** ...	**Acrid.**
Corylus Colurna, Linn.	**Findak** ...	**" 494** ...	**Demulcent.**
Zingiber officinale, Roxb.	**Sonth** ...	**Drury, 163** ...	**Aromatic.**
Moschus ...	**Mushk** ...	...	**Ditto.**
Aquilaria Agallocha, Roxb.	**Úd** ...	**Brandis, 387** ...	**Tonic.**
Amber ..	**Kahruba** ...	...	**Ditto.**

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[1] The references are to Brandis' *Forest Flora*, Drury's *Useful Plants*, Hooker's *Flora of British India*, and the *Pharmacopœia of India*.

Scientific name.	Vernacular name.	Reference.	Real use.
	Dry medicines.		
Prunella (species) ...	Ustúkhúdús ..	...	Aromatic.
Raw silk ...	Ab-i-reshm ...	...	Inert.
Centaurea Behhen,	Bahman ...	...	Tonic.
Psoralea corylifolia, Linn.	Bábchi ...	Hooker, II., 103 .	Ditto.
Cinnamomum zeylanicum, Bayn.	Dálchini ...	Brandis, 375 ...	Aromatic.
Cinnamomum Tamala, Nees.	Kirkiriya ...	„ 374 ...	Ditto.
Mentha sativa, Linn.	Padína ...	...	Ditto.
Crocus sativus Linn.	Zafrán ...	...	Inert.
	Moist remedies.		
Phyllanthus Emblica, Linn.	Aonla ...	Brandis, 454 ...	Astringent.
Silica (of the bambu),	Tabáshir ..	„ 566 ...	Inert.
Vitis vinifera (raisins).	Zirishk ..	„ 93 ...	Demulcent.
Camphor ...	Kafúr ..	...	Aromatic.
Onosma echioides, Sm.	Gau-zabán ...	...	Tonic.
Coriandrum sativum, Linn.	Dhaniya ..	Hooker, II., 717,	Aromatic.
Nymphæa stellata, Willd.	Nílofar ...	...	Inert.

"From the above list it will be seen that many of the cold remedies are what are used in European therapeutics as astringent medicines, while the hot remedies are principally aromatics, while remedies having various properties fall under the dry and moist categories."

A.

Abrus precatorius, Linn.—A Indian liquorice—*Gunchi, rakti, ratnaliya;* described by Baker in Hooker, Fl. Ind., II., 175. The red or white seeds are used as a weight and as beads in a rosary ; hence the specific name, and also for fistula in native practice .The root is used as a substitute for, and to adulterate, true liquorice, and an extract from it, like that from the latter, is officinal. Pharm., 74, 446.

Abutilon indicum, Don.—*Kangai ;* described by Masters in Hooker, I., 326. The leaves yield a mucilaginous extract used as a demulcent. The root is used in leprosy and in infusion as a cooling drink, and the seeds are considered laxative and are given in coughs.

Acacia arabica, Willd.—*Babul;* described by Baker in Hooker, II., 293. This tree and others of the same genus yield a gum which is used as a substitute for gum-arabic. The bark is considered a powerful astringent and is used as a substitute for oak bark, and the leaves enter into preparations for sores and cutaneous affections Pharm., 62, 77.

Acacia Catechu, Willd.—*Khair;* described by Baker in Hooker, II., 295. The extract called *kath* yields an active principle consisting of mimotannic acid and catechu and is used as an astringent and tonic. Pharm., 62, 63.

Achyranthes aspera, Linn.—*Chirchira;* described by Drury (U. P., 4). The seeds are given in cutaneous diseases, the flowering spikes in hydrophobia, the bruised leaves as an application for stings, and the dried plant in colic. Pharm., 184.

Aconitum ferox, Linn.—Aconite—*Mitha-zahar* (bazaar), *maura-bikh* (root), *mahúr*; described by Hooker and Thomson, I., 28: see also Pharm., 3, 434. This species is found above 10,000 feet and is largely export ed. It yields a deadly poison used in rheumatism and neuralgia.

Aconitum heterophyllum, Linn.—Aconite—*Atís* (root); described by Hooker and Thomson, I., 29. This species also grows at high elevations above 8,000 feet. It is used as a tonic, febrifuge, and aphrodisiac, and with *A. Lycoctonum* (*Bish.*) and *A. Napellus* (*Piliya-kachang* and *dúdhiya*, the roots), occurring at similar elevations, is exported in small quantities to the plains. Pharm., 4, 434.

Acorus calamus, Linn.—*Gur-bach*, *bach* (root); described by Drury (U. P., 13). The dried rhizomes are used as a bitter, aromatic tonic in fevers, rheumatism, and dyspepsia, and are exported to the extent of about 26 tons every year from the Kumaun forest division. Pharm., 249.

Actiniopteris radiata.—The *Asplenium radiatum* of Royle—*Mor-pankhi*, *Mor-pachh.* This fern is used as an anthelmintic. The root of *Goniopteris proliferum* is used in fevers and that of *Nephrolepis cordifolia* in electuaries.

Adiantum Capillus-veneris, Linn.—Maiden's hair fern—the *mubáraka* of Kumaun. This fern and *A. venustum* (*Pareseoshán*, *hansráj*) are exported from the Kumaun forest division, both as a medicine and a dye, to the extent of about 10 maunds a year. They are both considered astringent, aromatic, tonic, and emetic in large doses. The rhizomes and dried leaves of various other species of ferns are sold in the bazaars under the names *iskulikandriyún* and *balúkanbún*, corruptions of the names *Scolopendrium* and *Polypodium*

Ægle Marmelos, Corr.—Bael—*Bel;* described by Hooker, I., 516. The fruit is a specific in atonic diarrhœa and dysentery. Pharm., 46, 441.

Albizzia Lebbek, Benth.—*Siras;* described by Baker in Hooker, II., 298. The bark is applied to sore eyes and the root in making an ointment used in ophthalmia and in cutaneous affections and is given in decoction for diarrhœa.

Allium Cepa, Linn.—Onion—*Piyáj*. This common vegetable is used in special diseases as a stimulant, diuretic, and expectorant. *A. sativum*—Garlic—*Lahsan*—is supposed to have similar properties in native medicine.

Aloe indica, Royle—*Ghikawár;* described by Drury (U.P., 26). The bitter inspissated juice contains a cathartic principle. *A. perfoliata*, Roxb., occurs rarely in gardens in Kumaun. Pharm., 242.

Alstonia scholaris, R. Br.—*Chhatiyún, satiyún* of the Bhábar; described by Drury (U. P., 29). The bark is a powerful tonic, anthelmintic, and antiperiodic: the milky juice is applied to ulcers and mixed with oil in ear-ache. It is also valuable in dysentery and diarrhœa. *A. lucida*, the *dúdhi* of Kumaun, is found on the first range and is said to possess similar properties. Pharm., 137, 455.

Amarantus farinaceus and others of the same and allied genera are held to possess diuretic and purifying properties. Pharm., 184.

Anagallis arvensis, Linn., var. *cærulea*—Pimpernel—*Jonkhmári, jainghani;* described by Drury (F. P., II., 128). Triturated it is used to intoxicate fish and to expel leeches from the nostrils. It is also used in cerebral affections, leprosy, hydrophobia, and dropsy.

Anatherum muricatum, Beauv.—*Kas* or *khas;* described by Drury (U. P., 38). The roots are given in infusion as a febrifuge and in powder in bilious affections and also yield an oil.

Aneilema tuberosa, Ham., *Murdannia scapiflora*, Royle—*Músli-siyáh* and *safed* (roots). The rootlets furnish an astringent, tonic preparation and are exported for this purpose from Kumaun. Pharm., 235.

Anisomeles ovata, R. Br.—*Gobara*; described by Drury (F. P., II., 557). This plant has carminative, astringent, and tonic properties and also yields an oil. Pharm., 168.

Anona squamosa, Linn.—Custard-apple—*Sítaphal*, *sharífah*. Hooker, Fl. Ind., I., 63. The powdered seeds mixed with flour of gram and water make a hair-wash and the bruised leaves with salt make a cataplasm to induce suppuration.

Artemisia vulgaris, Linn.—*Páti*; described by Roxburgh, 599. This species is common in Kumaun; it has stomachic and tonic properties and is given in fevers. *A. scoparia*, Wall.—*Jhao*—has similar uses. Pharm., 122, 126.

Argemone mexicana, Linn.—*Kantela*; described by Hooker and Thomson, I., 117. An introduced plant now completely naturalized. The seeds yield an oil, used as a mild, cooling laxative. The juice of the plant is diuretic, relieves blisters and heals excoriations and indolent ulcers. Pharm., 22, 440.

Argyreia speciosa, Choisy—*Gao-patta*, *bich-tárak*; found wild in the Dehra Dún and the Bhábar, described by Drury (U. P., 49). The leaves are used as emollient poultices for wounds and externally in skin diseases, having rubefacient and vesicant properties. *A. setosa* occurs in the Sarju valley near Kapkot. Pharm., 157.

Artocarpus integrifolia, Linn.—Jack-tree—*kathal*; described by Brandis, 425. The juice of the trunk is used in glandular swellings, the young leaves in skin diseases, and the root in decoction in diarrhœa.

Asparagus adscendens, Roxb.—*Khairuwa*; described by Roxburgh, 291. The tuber of this species is used as a demulcent and tonic.

Asparagus racemosus, Willd.—*Sitṛáwal* (plant), *bozidán* (root), *haliyún* (fruit). The root is used in special diseases and has also demulcent properties in veterinary medicine. Pharm., 243.

B.

Bœnninghausenia albiflora, Reich.—White rue—*Písu-ghás;* described by Hooker, I., 486. Exported and used as a medicine for poultry.

Balanites Roxburghii, Planch.—*Inguwa;* is found in Dehra Dún (Royle), and is described by Bennett, I., 522. The leaves have anthelmintic properties and the bark is used as a cattle medicine. The unripe drupes have strong cathartic properties, but when ripe are pleasant and the seeds are given for coughs.

Baliospermum indicum, Dne.—Croton—*Jangli jamálgota;* described by Drury (F. P., III., 192). The seeds are used as a purgative, but in over-doses are an acro-narcotic poison. They are also used externally as a stimulant and rubefacient. The oil is a powerful hydragogue, cathartic, and useful for external application in rheumatism. Pharm., 201.

Barleria cristata, Linn.—*Gorp-jíbha, kála-bánsa* (leaves); described by Roxburgh, 471. The seeds are supposed to be an antidote for snake-bites and the roots and leaves are used to reduce swellings and in coughs.

Bassia butyracea, Roxburgh (see page 715 *antea*). The butter is used for rheumatism and as a pomade and lip-salve. The oil of *B. latifolia* is used for soap and emollient ointments and the spirit distilled from the flowers as a stimulant. Pharm., 130, 131.

Bauhinia variegata, Linn.—*Khwairál, kachnár;* described by Baker, II., 284. The root in decoction is useful in dyspepsia and flatulency; the flowers with sugar as a gentle laxative; and the bark, flowers or root triturated in rice-water as a cataplasm to promote suppuration.

Benincasa cerifera, Savi—*Bhunja, petha, kumhra* (see page 700). This gourd has alexipharmic and tonic properties and is given in dysuria in native practice.

Berberis Lycium, Royle—*Kashmal;* described by Hooker and Thomson, I., 110. The root is known as *kingora-ki-jar* in the hills and *dár-haldí* and *dár-chob* in the plains. An extract from the roots is known as *rasaut*, and it is chiefly from this species that it is obtained in Sirmor and Garhwál. The medicinal extract is highly esteemed as a febrifuge and as a local application in eye-diseases. It is said by some to have been known to the ancient Greeks and Romans as 'Lykion,' and pots labelled "Best Himálayan Lykion" have been found in the ruins of Pompeii, but this identification is disputed. In Kumaun *B. aristata* and *B. asiatica* yield *rasaut*. The average annual export of the root from the Kumaun forest division is about two maunds and from Garhwál about double the quantity. Pharm., 13, 436.

Boerhaavia diffusa, Linn.—*Gáda-purna;* described by Drury (F. P., III., 34). The root of this common weed is given in infusion as a laxative, anthelmintic, and cooling medicine. Pharm., 185.

Bombax malabaricum, D.C.—*Semal;* described by Masters in Hooker, I., 349. The gum is given in asthenic cases; the root furnishes one of the *musali* and is used as a stimulant and tonic and in large doses as an emetic, and the leaves are employed as an aphrodisiac and in special diseases. Pharm., 36.

Boswellia thurifera, Cole—Indian frankincense—the *salhi* of Garhwál; described by Drury (U. P., 84). The gum is prescribed with clarified butter in special diseases, with cocoa-nut oil for sores, and as a stimulant in pulmonary diseases. Pharm., 52.

Brassica nigra, Koch.—Black mustard—*Káli sarson.* This and the allied species, *B. alba* and *B. juncea,* are frequently used in medicine as rubefacients and vesicants. Pharm., 25.

Briedelia montana, Roxb.—*Kangnaliya;* described by Roxburgh, 705. Reported to possess astringent and anthelmintic properties and found at 3-4,000 feet.

Buchanania latifolia, Roxb.—*Chironji;* described by Brandis, 127. The oil extracted from the kernels of the fruit is used as a substitute for almond oil in native medicinal preparations and confectionery.

Butea frondosa, Roxb.—*Palás, dhák;* described by Brandis, 142. The inspissated juice obtainable by incision is used as a substitute for kino: the seeds as a vermifuge and anthelmintic and when made into a paste as a remedy for ring-worm. *B. parviflora*—*maula*—has similar properties. Pharm., 73, 74, 79, 446.

Buxus sempervirens, Linn.—*Papri, shamáj;* described by Brandis, 447. A tincture from the bark is used as a febrifuge.

C.

Cæsalpinia Bonducella, Fleming—*Karaunj;* described by Baker, II., 254. The kernels are used as a tonic in fevers and made into an ointment with castor-oil and applied externally in hydrocele. An oil is extracted from the leaves which is used in palsy and rheumatism. Pharm., 68, 446.

Callicarpa arborea, Roxb.—*Ghiwála;* described by Drury (U. P., 97). The bark is aromatic and bitter and is applied in decoction in cutaneous affections.

Calosanthes indica, Blume—*Pharkath;* described by Drury (U. P. 100). The bark is astringent and used in applications to cuts and fractures. The seeds are applied to abscesses and the officinal *syonak* seems to be procured from the leaves.

Calotropis procera, R. Br.—*Madár, ák;* described by Brandis, 331. The root, bark, and inspissated juice are used extensively for their emetic, diaphoretic, alterative and purgative properties. Pharm., 141, 457, 458.

Canna indica, Linn.—Indian shot—*Kiwára;* described by Drury (U. P., 106). The root is used as a diaphoretic and diuretic in fevers and dropsy.

Cannabis indica, Linn.—*Bhang.* See intoxicating drugs, *postea*, and Pharm., 216, 463.

Capparis horrida, Linn.—*Ulta-kánta, [illegible]-kánta;* described by Hooker and Thomson, I., 178. Found in the Bhábar. A cataplasm of the leaves is considered useful in boils, swellings, and piles.

Capsicum frutescens, Linn.—*Mircha, kursáni;* prescribed in native practice in gout, dyspepsia, cholera, and ague.

Careya arborea, Roxb.—*Vákamba, kúmbhi;* described by Clarke in Hooker, II., 511. The flowers are given as a tonic in sherbet after childbirth.

Carum copticum, Benth.—Lovage—*Ajwáin;* described by Clarke, II., 682. This plant possesses valuable stimulant, carminative and antispasmodic properties; it aids digestion, and is used in colic, colds, rheumatism and fever and is also esteemed as a diuretic. Pharm., 98, 99, 447. *C. Carui*, Linn.—Carraway—*Kálajíra*—(Hooker, *l. c.*, 680) occurs at the same elevations (8-10,000 feet) and possesses similar virtues. Both are exported to the plains.

Cassia Absus, Linn.—*Banár;* described by Baker, II., 265. The seeds are used in powder applied beneath the eyelids or in the form of an ointment in ophthalmia. Pharm., 78.

Cassia Fistula, Linn.—*Kitola, itola, ráj-briksh* of the Bhábar; described by Baker, II., 256. This tree yields the commonest cathartic used in native medicine. The pulp around the seeds is a valuable laxative, the flowers are used as a febrifuge made into a confection known as *gúl-kand*, and the root is a strong purgative. The bark and leaves are applied to cutaneous eruptions. Pharm., 65.

Cassia Sophera, Linn.—*Banár* of the Bhábar; described by Baker, II., 262. The bark, leaves, and seeds of this tall weed are cathartic and the juice of the young leaves is applied in ringworm. *C. Tora* has the same native name in Kumaun; its leaves are eaten by men and animals and the seeds are used as a remedy for itch. Pharm., 78.

Cedrela Toona, Roxb.—*Túni;* described by Drury (U. P., 128). The bark is astringent and has been found a fair substitute for quinine in fevers and bowel complaints, especially with young children. Pharm., 55.

Celosia argentea, Linn.—*Siráli, sarwáli, gogiya;* described by Drury (F. P., III., 15). The seeds are used chiefly in special diseases.

Chavica Roxburghii, Miq.—*Piper longum*, Linn.—fruit *pípla-múl*; described by Drury (U. P., 131). *P. longum*, var. *silvaticum*, grows wild and the fruit is largely exported as a condiment and a stimulant in medicine. Pharm., 208.

Chenopodium album, Linn.—*Bhatuwa;* described by Drury (F. P., III., 5). It is used in special diseases and as a laxative in spleen and bilious disorders.

Cicer arietinum, Linn.—Gram—*Chana* (see page 693). The hairs of the stem and leaves exude an acid used as a refrigerant in fevers; the seeds are considered stimulant and when roasted are used as a substitute for coffee berries. Pharm., 80.

Cinnamomum Tamala, Nees—*Taj* (bark), *tejpát* (leaves); described by Brandis, 374. The bark and leaves are used as a carminative, aromatic and stimulant in coughs and dyspepsia and generally as a substitute for true cinnamon. Pharm., 196.

Cissampelos Pareira, Linn.—*Pari;* described by Hooker and Thomson, I.,203. The dried root has diuretic, tonic and slightly aperient qualities and forms part of the *píli-jari* or 'yellow-root' of the native Materia Medica. The leaves are applied to abscesses. Pharm., 7.

Citrullus Colocynthis, Schrad.—*Indráyan* (see page 701). The fruit affords a safe and active cathartic in hepatic and visceral congestion. *C. Hardwickii,* the *air-alu* of Kumaun and *paháriindráyan* of the plains, has similar properties. Pharm., 94.

Citrus Aurantium, Linn.—Orange—*Nárangi*—(2) *C. medica*—*Bijaura*—(3) *C.* var. *Limonum*—*Jámíra*—and (4) *C.* var. *Limetta*—*Amritphal*—are all used in medicine as tonics and purifiers of the blood, refrigerants in fevers, flavouring materials in infusions, pomades, &c., anti-scorbutics, stomachics, and carminatives. The juice is exported from the Kumaun forest-division to a great extent every year. Pharm., 42, 43, 45.

Cleome viscosa, Linn.—*Jangli-harhar;* described by Hooker and Thomson, I., 170. The seeds are considered anthelmintic; the leaves are used as a vesicant, and boiled in clarified butter are applied to wounds, and the juice to ulcers. The root is administered in decoction as a febrifuge. This plant is often confounded with *Gynandropsis pentaphylla.*

Clerodendron serratum, Spr.—*Ganth-baharangi;* described by Drury (U. P., 141). The leaves of this common plant are boiled in oil for applications in ophthalmia: the roots boiled in water with ginger and coriander are given in nausea, and the seeds are slightly aperient. The leaves of *C. infortunatum,* Linn.—*Bhat*—also afford a cheap and efficient tonic and antiperiodic. Pharm.,

164. *C. Siphonanthus*, R. Br.—*Arni*—also occurs and its roots and leaves are officinal in native practice.

Cochlospermum Gossypium, D. C.—*Katera, gajra;* described by Hooker and Thomson, I., 190. This small tree yields a gum used as a demulcent in coughs and special diseases. Pharm., 27.

Colocasia antiquorum, Schott.—*Kachu, arwi;* described by Drury (U. P., 155). The inspissated juice of the petioles is a capital styptic for wounds. Pharm., 250.

Commelyna obliqua, Don.—*Kanjura, kána.* The root is useful in vertigo, fevers, and bilious affections, and is said to be used as an antidote to snake-bites.

Corchorus olitorius, Linn.—*Banphal;* found in Dehra Dún; described by Masters in Hooker, Fl. Ind., I., 397. The leaves are emollient and used in infusion as a refrigerant in fevers and special diseases. The dried plant toasted and powdered is used in visceral obstructions.

Cordia latifolia, Roxb.—*Bairálu, baurála;* described by Drury (U. P., 160). The fruit is used as an expectorant and astringent. Pharm., 157.

Cordia Myxa, Linn.—*Koda;* described by Drury (U. P., 161). The pulp of the fruit is used as a laxative and the seeds mixed with oil are deemed a specific in ringworm. The juice of the bark in infusion is given with cocoa-nut oil in gripes. Pharm., 157.

Coriandrum sativum, Linn.—Coriander—*Dhaniya;* described by Clarke, II., 717. The dried ripe fruit and the volatile oil are both used in medicine as an aromatic stimulant in colic and the like. Pharm., 101.

Costus speciosus, S. M.—*Keyu, keoli, kút-shirín* (root); described by Drury (U. P., 164). From the root a strengthening tonic is made and it is also used as an anthelmintic.

Crinum asiaticum, var. *toxicarium*, Herb.—*Chindar, kanwal, pindar, kanmu;* described by Roxburgh, 283. A valuable emetic; in small doses nauseant and diaphoretic. The dried sliced roots are also emetic: the leaves with castor-oil are used in rheumatism and the juice in ear-ache. Pharm.. 234.

Cucurbita Pepo, Linn.—*Bhúnga, petha*; and *C. maxima—gadura* (see page 702). Both these gourds are used in medicine; the leaves as applications for burns and the seeds as anthelmintics. Pharm., 96.

Cuminum Cyminum, Linn.—*Jíra* (see page 705.) Both fruit and oil possess carminative properties allied to dill and coriander: the seeds are largely exported to the plains. Pharm., 108.

Curculigo orchioides, Gœrtn.—*Petári*; described by Drury (F. P., III., 458). The tuberous roots are some of those known as *músli-siyáh* and are held in the highest esteem by native physicians as a specific in special diseases. Pharm., 235.

Curcuma longa, Roxb.—Turmeric—*Haldi* (see page 706.) This is much used as an application in bruises: the fresh juice as an anthelmintic; the fumes of the burning root in coryza and the root in decoction for relieving catarrh and purulent ophthalmia. Pharm., 231.

Cymbopogon Martini, Munro—*Bujina, púla-khari*. The oil, known as *raus-ka-tel* and Nimar oil, enters largely into native perfumery. The roots of *C. laniger—Píriya*—are also used as an aromatic stimulant (see Drury, F. P., III., 641). Pharm., 256.

Cynodon Dactylon, Pers.—*Dúb*; described by Drury (U. P., 180). This grass yields a cooling decoction from the roots and young leaves found useful in fever.

Cyperus rotundus, Linn.—*Motha*; described by Drury (U. P., 182). The roots are held to be diaphoretic, diuretic, and astringent Pharm., 250.

D.

Dalbergia Sissoo, Roxb.—*Sisu*; described by Drury (U. P., 186). The leaves and saw-dust in decoction are esteemed in eruptive and special diseases and to allay vomiting. The oil is also applied externally in cutaneous affections.

Datisca cannabina, Linn.—*Bujr-bhanga, bhang-jala* (roots); described by Clarke, II., 656. The roots are exported as a medicine useful as a sedative in rheumatism and to aid in dyeing red.

Datura alba, Linn.—*Dhatúra;* described by Drury (U. P., 188). The leaves and seeds are used as anodynes and antispasmodics. Pharm., 175, 460.

Daucus Carota, Linn.—Carrot—*Gájar*. This common vegetable is used as a poultice for ulcers and boils.

Delphinium Brunonianum, Royle—*Nepári;* described by Hooker and Thomson, I., 27. Occurs at 14,000 feet and is exported for its highly musk-scented leaves, used in native perfumery and for temple offerings.

Dendrocalamus strictus, Nees—Bambu—*Báns, básila;* described by Brandis, 529. The bambu yields a siliceous secretion in the joints of the female plant, called *báns-lochan* or *tabashír*, considered by the Baids to be useful as a stimulant and aphrodisiac. The root is said to be a diluent, the leaves are used as an emenagogue and anthelmintic and the dried stems as splinters in surgery, which seems to be the only really valuable use that the products of the bambu are put to in medicine. The product *bans-lochan* is exported in small quantities from Kumaun. Pharm., 256.

Desmodium triflorum, D. C.—*Kudaliya;* described by Drury (U. P., 190). The fresh leaves are applied to wounds and abscesses that do not heal well.

Dioscorea versicolor, Wall.—Yam —*Genthi, gajir*. The tubers yield a farinaceous food for invalids.

Diospyros Melanoxylon, Roxb.—*Tendu;* described by Brandis, 294. This and the other species of ebony afford an astringent from the bark which is used in decoction in diarrhœa, dyspepsia, and the like as a tonic. Pharm., 132.

Dolichos sinensis, Linn.—*Lobiya* (see page 695). This and other similar pulses are prescribed in special diseases and as stomachics.

Drosera peltata, Gm.—*Mukha-jali;* described by Clarke, II., 424. The leaves bruised and mixed with salt are used as a blister in Kumaun.

E.

Eclipta erecta, Linn.—*Moch-kand, bhangra, bábri;* described by Drury (U. P., 202). The fresh plant is applied with sesamum oil in elephantiasis; the expressed juice in affections of the liver, spleen, and dropsy, and in large doses as an emetic; also as a black hair-dye. The average annual export from the Kumaun forest division is about 5 maunds. Pharm., 128.

Elæagnus umbellata, Thunb.—*Ghiwáin, kankol;* common in the hills from the Jumna to the Sárda; described by Brandis, 390. The seeds are reported to be used as a stimulant in coughs, the expressed oil in pulmonary affections, and the flowers as a cardiac and astringent.

Elæodendron glaucum, Pers.—*Shauriya* (Kumaun) and *jamuwa* (Dehra Dún); described by Roxburgh, 214. The root is held to be an antidote in snake-bites; a decoction or cold infusion of the fresh bark of the roots is applied to swellings.

Embelia robusta, Roxb.—*Bayabirang* (fruit); described by Brandis, 284. The fruit is said to be used to adulterate black pepper like that of *E. Ribes*, which has the same vernacular name and is given as an anthelmintic and internally for piles. The greater portion of the *bayabirang* exported from Kumaun seems to be the fruit of *Myrsine africana.*

Eragrostis cynosuroides, Ret.—*Dábh.* A common grass said to possess diuretic and stimulant virtues.

Eugenia Jambolana, Lam.—*Phaunda;* described by Brandis, 233. The leaves and bark are astringent.

Euphorbia pentagona, Bois.—*Sehund.* This and other species of the same genus yield an acrid milky juice having cathartic and anthelmintic properties. Pharm., 204.

Exacum tetragonum, Roxb.—*Titakhana;* described by Roxburgh, 133. It is used as a tonic in fevers and a stomachic bitter. Pharm., 149.

F.

Feronia Elephantum, Corr.—*Kath-bel;* found in the Siwáliks and Bhábar; described by Drury (U. P., 220). This tree yields a gum used for the same purposes as gum-arabic; and the leaves are carminative and stomachic, especially with children. Pharm., 48.

Ficus Carica, Linn.—Fig—*Anjír;* described by Brandis, 418. The fruit is used medicinally as a laxative.

Ficus indica, Roxb. (*F. bengalensis*, Linn.)—*Bar*, *bat*; described by Drury (U. P., 221). The juice collected from incisions in the bark of the banyan-tree is considered a specific in cracked heels, excoriations, and sometimes for teeth-ache, lumbago, and croup. Pharm., 217.

Ficus religiosa, Linn.—*Pipal*; described by Drury (U. P., 225). The young shoots are used as a purgative and have some reputation in skin diseases; the bark of this and the preceding is used as a tonic in decoction. The seeds are given in electuary as a purifier of the blood.

Ficus hispida, Linn., *f.*—*Kágoha*, *gobla*, *dhúra*, *totmíla*; described by Brandis, 423. The fruit, seeds, and bark are possessed of emetic properties. Pharm., 217.

Ficus glomerata, Roxb.—*Gúlar*; described by Brandis, 422. The bark is used as an astringent and a wash for wounds. The milky juice is given in piles and diarrhœa and in combination with sesamum oil in cancer. The root is useful in dysentery.

Flacourtia sepiaria, Roxb.—*Kandai*; described by Brandis, 18. This tree yields an antidote to snake-bites from an infusion of the leaves and roots: the bark triturated in sesamum oil is used as a liniment in rheumatism.

Fœniculum vulgare, Linn. Fennel—*Sonf*; described by Clarke in Hooker, II., 695. It is used as a carminative and stomachic, cultivated. Pharm., 100.

Fraxinus floribunda, Wall.—*Angu*; described by Brandis, 302. A concrete saccharine exudation (manna) from the stem is obtained by incision and is a substitute for the officinal manna. Pharm., 136.

Fumaria parviflora, Lam.; Var. *Vaillantii*, the *Khairuwa* of Kumaun, also known as *pitpápra*, *mijálu*; described by Hooker, *f.*, and Anderson in Hooker, I., 128. The dried herb is employed as a diuretic, anthelmintic, diaphoretic, and aperient, especially as a blood purifier. The average annual export from the Kumaun forest division is about 32 maunds.

G.

Gentiana Kurroo, Royle.—*Kuru*, *kútki*—Himálayan gentian. This plant occurs near the snows. There are four or five allied species, all of which are exported to the plains to the extent of about five tons a year, and are there sold as a valuable bitter tonic. See Royle, Ill. Bot., Him. Moun., pl. 58, fig. 2, and Pharm., 149.

Geranium ocellatum, Camb.—*Bhánd;* described by Edgeworth and Hooker, *f.*, in Hooker, I., 433. A very common plant in Kumaun, which possesses diuretic and astringent properties.

Gloriosa superba, Linn.—*Bish nangál, bish ningála;* described by Drury (U: P., 234). The root is used in special diseases, but is said to be poisonous in large doses. Pharm., 242.

Gmelina arborea, Roxb.—*Kumbhár, gumbhár;* described by Drury (U. P., 234). The root is given in coughs, rheumatism, and special diseases, and is said to have anthelmintic properties like *A. asiatica.* Pharm., 164.

Gossypium herbaceum, Linn.—Cotton—*Kapás.* The down of this well-known shrub is applied to burns ; the seeds to increase milk, also in epilepsy and as an antidote to snake-poison ; the root as a diuretic, emenagogue, and demulcent, and the leaves in decoction as a tonic in fever and diarrhœa. Pharm., 33.

Grewia asiatica, Linn.—*Pharsiya;* described by Masters in Hooker, I., 386. The leaves are used as an application to pustular eruptions and the fruit in sherbet as a refrigerant in fevers and a gargle for sore-throat.

Gynandropsis pentaphylla, D. C.—*Kathal parhar;* described by Hooker, *f.*, and Thomson in Hooker, I., 171. It occurs common in the Bhábar ; the leaves are used as a rubefacient and vesicant ; the expressed juice is given with salt in earache ; the seeds in powder are given with sugar internally in fevers and bilious complaints, and the entire plant with sesamum oil is used as an ointment in cutaneous affections. Pharm. 25. This plant is often confounded with *Cleome viscosa* in native shops.

H.

Hedychium spicatum, Smith—*Kachúr-kachu, kapúr-kachri, banhaldi.* It possesses carminative and stimulant properties and is especially used as a cattle medicine : it is exported from Kumaun to the extent of a few tons annually. Pharm., 232.

Helicteres Isora Linn.—*Jhonkha-phal*, *maror-phal*; described by Masters in Hooker, I., 365. The seeds according to 'the doctrine of signatures' are considered useful in colic and diarrhœa and as a blood purifier: and are exported from the Kumaun forest division to the extent of about a ton per annum.

Heliotropium brevifolium, Wall.—*Safed-bhangra*, *chiti phúl*. The whole plant is laxative and diuretic; the juice is used as an application to sore-eyes, gum-boils and sores generally to promote suppuration and as a cure for the sting of nettles and insects.

Herpestis Monniera, H. B. *et* K.—*Jal-ním*; described by Drury (U. P., 249). A dose of six *máshas* of the leaves steeped in water is an esteemed aperient; the water may be used as an embrocation in skin diseases and croup, and the juice with kerosine-oil is used in rheumatism Pharm., 161.

Hiptage Madablota, Gœrtn.—*Aita-lugala*; described by Hooker, I., 418. The leaves are esteemed useful in cutaneous diseases.

Holarrhena antidysenterica, R. *Br.*—*Kuár and moriya* of Bijnor and *kúer*, *kúda*, *kura* of Kumaun; described by Brandis, 326. The bark is a specific in dysentery: hence the name, and the seeds are also said to possess similar properties. Pharm., 137, 455.

Hordeum hexastichon, Linn.—Barley—*Jau*. The husked seeds form pearl barley, a favourite food for invalids and in decoction a drink in fevers. Pharm., 253.

Hymenodictyon excelsum, Wall.—*Bhúlan*, *bhalena*, *bhamena*, *dhauli*; common in the Kota Dún; described by Brandis, 267. The inner coat of the bark possesses the bitterness of cinchona and its astringent properties. Pharm, 117.

Hyoscyamus niger, Linn.—Henbane—*Khorasáni ajwáin* (seeds); occurs wild and is also cultivated. The seeds are given in native medicine as an anodyne and sedative in mental diseases. Pharm., 178.

I.

Ichnocarpus frutescens, R. Br.—*Dúdhi*; described by Drury (U. P., 259). The root possesses alterative, tonic properties and is employed as a substitute for sarsaparilla: the stalks and leaves are used as a decoction in fevers. Pharm., 138.

J.

Jasminum grandiflorum, Linn.—*Jáhi;* very abundant in low valleys; described by Brandis, 313. The flowers and their essence are used as an application in skin diseases, headache and weak eyes: the leaves are used in toothache. Other species of this genus are also found in Kumaun and are employed in making perfumed waters.

Jatropha Curcas, Linn.—*Safed ind;* described by Drury (U. P., 276). The oil from the seeds is used as a purgative, but is uncertain: it is also applied diluted in rheumatism: the leaves warmed with castor-oil form a poultice for bruises: the seeds in over-doses are poisonous, and the milky juice is used to destroy maggots in sores on sheep. Pharm., 203.

Juglans regia, Linn.—Walnut—*Akor, akhrot, kharot.* The bark is used as an anthelmintic: the leaves are astringent and tonic and in decoction a specific in strumous sores: the fruit is given in special diseases and rheumatism. τοῦ ὀνόματο;

Justicia Adhatoda, Linn.—*Bashing;* described by Drury as *Adhatoda vasica* (U. P., 16). The flowers, leaves, and roots are considered antispasmodic and anthelmintic; the juice is found useful in pulmonary affections, and a tincture is also commonly given as an expectorant. Pharm., 162.

K.

Kydia calycina, R. W.—*Puta;* described by Masters in Hooker, I., 348. The bark is mucilaginous and is used to clarify sugar.

L.

Lepidium sativum, Linn.—Cress—*Halang.* The seeds of this common vegetable are used as a tonic laxative and antiscorbutic and as a gentle stimulant in indigestion.

Lilium wallichianum, Royle—*Findora.* The dried bulb scales possess demulcent properties and are used like salep in pectoral complaints.

Limonia acidissima, Linn.—*Bali;* described by Hooker, I., 507. The root is purgative, sudorific, and used in colic: the leaves in epilepsy and the dried fruit as a tonic and disinfectant. Pharm., 43.

Linum usitatissimum, Linn.—Flax. The seeds are the linseed of the pharmacopœia, of which the uses are well known. Pharm., 37.

M.

Mallotus phillipinensis, Müll.—*Roini, roli;* described by Drury as *Rottlera tinctoria* (U. P., 378). The powder on the seeds is a valuable anthelmintic, vermifuge, and purgative. Pharm., 202.

Malva rotundifolia, Linn.—*Sonchala;* described by Masters in Hooker, I., 320. The seeds are demulcent and are used especially in bronchitis, inflammation of the bladder, and hæmorrhoids, and externally in cutaneous affections and coughs.

Malva sylvestris, Linn.—*kanji, tilchuni;* described by Masters in Hooker, I., 320. It is a valuable demulcent in pulmonary affections and a substitute for the marsh mallow of Europe.

Mangifera indica, Linn.—Mango—*Amb.* The sliced rind of this well-known fruit is astringent and used as a stimulant tonic in debility of the stomach : the kernels are styptic in hæmorrhoids, astringent in diarrhœa, and tonic in fever. Pharm., 59.

Melia Azedarach, Linn.—*Bakáyan, dek, jek, betain;* described by Brandis, 68. The bark of the root and the pulp of the seeds are anthelmintic in small doses and poisonous in large doses. Pharm., 55.

Melia indica, Linn—*Ním;* described by Brandis, 67. The bark, leaves, and seeds are all really valuable ; the bark as a febrifuge and substitute for quinine; the leaves as a cataplasm for wounds and sores; and the seeds for their oil, which is used as an anthelmintic and an application to foul sores. Pharm., 55.

Mentha viridis, Linn.—Spearmint—*Paharí pudína.* The oil obtained by distillation from the fresh herb in flower is inferior only to peppermint and is useful in cholic, nausea, and flatulence. Pharm., 166.

Mimosa rubicaulis, Lam.—*Agla;* described by Baker in Hooker, II., 291; *M. pudica*, Linn.—*Lajawanti;* described by Hooker (*l.c.*) The seeds of both are used as purifiers of the blood, and the leaves are given in infusion in piles, and pounded they are applied to burns.

Mirabillis Jalapa Linn.—*Gúl-bánsa.* The root forms a safe and efficient purgative equal to jalap, and the leaves are applied to abscesses. Completely naturalised in Kumaun. Pharm., 184.

Momordica charantia. Willd.—*Karela;* described by Druary, U. P., 306 (see page 700). Used as a laxative and in preparation as an ointment for sores and the juice of the leaves as an anthelmintic.

Moringa pterygosperma. Gœrtn.—*Sahajna*—Horse-radish tree; described by Hooker, II., 45. The fresh roots are vesicant and rubefacient and useful in rheumatism. Used internally, the fresh juice of the roots has stimulant and diuretic properties and the root in decoction furnishes a gargle. The seeds yield a fine oil useful in rheumatism, and the tree itself a gum used as an anodyne in headache and as an application to buboes. Pharm., 61.

· **Morus indica.** Linn.—Indian mulberry—*Tútri;* described by Brandis, 408. The fruit forms a sherbet used as a refrigerant and the bark a vermifuge and purgative. The fruit of *M. serrata,* Roxb.—*Kemu*—and *M. lævigata,* Wall., *Siyáh-tút*—is said to possess similar properties. Brandis, 409.

Mucuna pruriens, D. C.—Cowhage—*Goncha;* described by Baker in Hooker, II., 187. The hairs of the legume are mechanically anthelmintic and are given in round worm: see Pharm, 73. The seeds are given with milk in special diseases and snake-bites and the leaves as a vermifuge. *M. atropurpurea,* the *ba lilhaki* of Kumaun, is said to possess similar properties.

Murraya Kœnigii, Spreng.—*Gani, gándla;* described by Hooker, I., 503. The seeds yield a clear transparent oil known as simboli oil; the root is laxative and both bark and roots are stimulant and used in cutaneous diseases and to check vomiting. Pharm., 49.

Musa Sapientum, Linn.—Plantain—*Kela.* This well-known fruit is demulcent, antiscorbutic, and alterative; the tender leaves are used as a dressing for wounds, blisters, and sores, and as eye-shades in ophthalmia; the root and stem are considered in native practice purifiers of the blood and are good in scorbutic complaints and special diseases. Pharm., 233.

Myrica sapida—*Káiphal;* described by Brandis, 493. The fruit is eaten, and the bark is used externally as an anthelmintic, stimulant, and rubefacient, and in the arts as a tanning agent. Natives use it in epilepsy and to rub the body after illness. The average annual export of this bark from the Kumaun forest division is about fifty tons. Pharm., 217.

Myrsine africana, Linn., the so-called box—*Puhári-cha, chtipra;* described by Brandis, 286. The fruit is said to be a powerful cathartic vermifuge. It is sold in the bazaars as *báyabirang*, a name also of *Embelia Ribes;* used also in dropsy, colic, and as a laxative. About a maund is exported every year from the Kumaun forest division. *M. semiserrata*, Wall., also called *chtipra*, is said to possess similar properties.

N.

Nardostachys Jatamansi, D. C.—Spikenard—*Bálchhar, shambal, balkar*. Royle, *t.* 54, *f.* 2. This plant occurs above 12,000 feet and its roots with those of certain species of Valerian, especially *V. Hardwickii* (*shameo*, roots), are exported through the Kumaun forest division to the extent of about twenty maunds per annum. They occur in the form of short pieces of an underground stem, about the thickness of a quill, covered towards one extremity or almost entirely with coarse, dark, hair-like fibres. It has all the properties of Valerian in a high degree and is used as a stimulant and antispasmodic in hysteria and epilepsy. *N. grandiflora*, a larger species, also occurs in Kumaun at similar elevations. Pharm., 120. : Bird., 46.

Nelumbium speciosum, Willd.—Lotus—*Kanwal;* described by Hooker *f.* and Thomson in Hooker, I., 116. The nuts are eaten as a tonic in disorders of the digestive functions.

Nerium odorum, Aiton.—Oleander—*Kaniyár;* described by Drury (U. P., 323). All parts of the plant are poisonous and are used in native practice in leprosy, cutaneous affections, and as an anthelmintic. The bark in paste is used in ringworm and itch and a decoction of the leaves externally as a vermifuge. Pharm., 139.

Nicotiana Tabacum, Linn.—Tobacco—*Tamáku, dhamáku.* For the medicinal uses of tobacco see Pharm., 178, 460, and O'Shaughn., 471.

Nyctanthes Arbor-tristis, Linn.—*Kúri, harsinghar;* described by Drury (U.P., 323). Used in native practice for ringworm and to promote the adhesion of broken bones, also in indigestion: the bark is an astringent and is used as a gargle and in applications to sores and ulcers.

O.

Odina Wodier, Roxb.—*Jingan, jíban;* described by Hooker, II., 29. The bark is used in decoction as a lotion in impetigo and obstinate ulcers: the gum and leaves have also astringent properties and are applied to bruises and wounds. Pharm., 60.

Olea glandulifera, Wall.—*Gair, galdú, garur;* described by Brandis, 309. The bark and leaves are astringent and are used as an antiperiodic in fevers.

Onosma echioides, Linn.—*Maharanga, lál-jari,* and *ratan-jot* (root), *gauzabán* (leaves), *gul-i-gau-zabán* (flowers). The bruised root is applied to eruptions, the leaves as an alterative, and the flowers in cases of rheumatism and palpitation of the heart as a cardiac and stimulant. Exported through Dehra Dún. The root is also used as a dye. It appears that under the name '*ratanjot*' the roots of *Geranium nodosum,* Linn.; of *Potentilla nepalensis,* Hook.; *Macrotomia euchroma,* H. *f.* *et.* T.; and *Jatropha Curcas,* are also collected and sold.

Ophelia Chirayta, Gris.; *Agàthotes chirayta,* Don.—*Títa-khána, chirayta.* Some call this species the true *Dákhini* chiretta or true Nepál chiretta. The former name is properly applied to a South-Indian species, *Andrographis paniculata,* and the latter name may perhaps suit, as *O. Chirata* occurs in Nepál. Equally good chiretta is obtained from *O. purpurascens, O. cordata, O. speciosa, Agathotes angustifolia* and *A. alata.* All yield a valuable bitter extract used as a tonic and febrifuge and corrector of biliary disturbance. About six tons are exported every year from the Kumaun forest division. See further Pharm., 149: As. Res., XI., 167.

Oxalis corniculata, Linn.—*Chalmori;* described by Edgeworth and Hooker *f.* in Hooker, I., 436. The leaves, stalks, and flowers possess refrigerant and antiscorbutic properties and are used internally in fevers, dysentery, and scurvy, and externally to remove warts. The juice is useful in removing iron-moulds.

P.

Pæonia emodi, Wall.—*Chandra* (the plant), *sujúniya* (the young edible shoots), *bhúma-madiya, yet ghás* of the Bhotiyas; described by Hooker *f.* and Thomson in Hooker, I., 30. The tubers are some of those exported under the name *bikh* and are probably those known as *padam-chhál*. There is nothing in the local Materia Medica requiring further investigation more than the roots exported under the name '*bikh*' and '*nirbisi*.' Under the former come the various species of aconite. *A. ferox* is the *maura, máúr* or *máhur bikh*, and Madden tested it to see whether it deserved the name '*mítha*,' sweet, and found it was so: but this was soon succeeded by the most distressing burning all over the mouth and fauces, though nothing was swallowed. Dr. Royle says that *Polygonatum verticillatum*, Linn., is called *mítha-dúdhiya* in Sirmor and *Smilacina pallida* is called *dúdhiya-mohura*, and both are poisonous. The cylindrical tuberous roots of *Delphinium kashmerianum*, Royle, found at Pindari in Kumaun and Bhojgara on the south side of the Kawári pass in Garhwál (11,000-14,000 feet), are absolutely identical with the ordinary *nirbisi* roots. See Madden, An. Mag., N. H., 2nd Ser., XVIII., 445.

Parmelia kamtschadalis, Esch.—Lichen—*Chalchalira, patcharke-phúl*. Several species are exported to the plains and are used in native practice as a tonic febrifuge and antiperiodic. See Pharm., 260.

Peucedanum graveolens, Benth.—Dill—*Soya;* described by Clarke in Hooker, II., 709. An excellent carminative for relieving flatulence in children. Pharm., 101.

Pharbitis Nil, Choisy—*Baunra;* described by Drury (U. P., 350). A safe and effectual cathartic. Pharm., 155.

Phyllanthus Emblica, Linn.—*Amla, aonla;* described by Brandis, 454. The dried fruit is astringent and when fresh is given as a tonic aperient: the flowers are refrigerant and aperient and the bark is astringent. See Pharm., 204, and O'Shaugh., 551. The leaves of *Paraphyllanthus urinaria* (*seruhi*) and of *Phyllanthus niruri*, Linn., are given in infusion as a diuretic and the fresh roots of both in jaundice. See Drury.

Picrorhiza Kurrua, Roxb.—*Kuruwa.* Found only at high elevations about 11,000-14,000 feet : the bitter roots are exported with *Saxifraga ligulata* under the name *pákhán-bed*, and with *Gentiana Kurroo* under the name *kútki*, to the extent of about three tons a year and are used as a tonic. *Nima quassioides* occurs in upper Garhwál (5,500-8000 feet) and is known as *karwi* and has similar uses.

Pinus longifolia, Roxb.--Pine--*Chír.* This pine is very common in Kumaun and yields a turpentine and resin : for uses see Pharm., 222, 219. The turpentine from *P. Gerardiana* is used principally in special diseases, and that from *P. Deodára* in cutaneous diseases and as a diuretic. Pharm., 225.

Pistacia integerrima, J. L. S.—*Kakra, kukra-singi ;* described by Hooker, II., 13. The gall-like excrescences formed on the leaves and petioles in October are exported as a medicine and are esteemed useful in coughs, asthma, fever and dysentery, and as a sedative. They occur black, hard, rugose, hollow, irregularly crooked, often 6′-7′ long. The average annual export from the Kumaun forest division is about seventy maunds. Brandis, 122, 574.

Pithecolobium bigeminum, Mart.—*Kachlora ;* described by Brandis, 173. A decoction of the leaves is used in leprosy and as a stimulant to promote the growth of hair.

Plantago major, Linn.—*Luhuriya.* It is doubtful whether this has the properties of *P. decumbens*, Forsk., the *isbaghol* of the bazars. Pharm., 182.

Plumbago zeylanica, Linn.—*Chita, chitra :* described by Roxburgh, 155. The roots triturated in water form a vesicant and in tincture a good antiperiodic : they are exported from the Kumaun forest division to the extent of about twelve maunds annually. Pharm., 170: O'Shaugh., 508.

Pongamia glabra, Vent.—*Pápar, Sukh-chain ;* described by Baker in Hooker, II., 240. The seeds yield an oil much used in skin diseases and as an embrocation in rheumatism : the leaves are also officinal. Pharm., 79, and J. Agri.-H., Cal., X., 223.

Pontedera vaginalis, Linn.—*Nauka;* described by Drury (U.P., 364). The root is chewed for toothache and the bark is eaten with sugar for asthma.

Populus ciliata, Wall.—*Chalniya, chauniya, chan, gar-pípal;* described by Brandis, 475. It is occasionally used as a tonic stimulant and purifier of the blood.

Portulaca oleracea, Linn.—Small purslain—*Lúniya-kúlfah;* described by Drury (U.P., 364). The bruised leaves are used as an anodyne and are given as a refrigerant and antiscorbutic in cutaneous diseases. Bird., 38.

Premna integrifolia, Linn.—*Bakarcha* of Garhwál; described by Drury (U.P., 365.) The root is given in decoction as a cordial and tonic; the leaves beaten up with pepper are also administered in colds and fevers. The whole plant is given in decoction in rheumatism and neuralgia. The milk of the bark of *P. mucronata,* the *agniún* of Kumaun, is applied to boils and the juice is given to cattle in colic.

Primula speciosa, Linn.—*Bish-kopra, jal-kútra.* It is found along streams from 3,500-5,500 feet in Kumaun: it is said to be poisonous to cattle and is used externally as an anodyne.

Prinsepia utilis, Royle.—*Chirara, jhatela, dhatela, phaláwa, bhekla;* described by Hooker, II., 323. This shrub yields an oil used as a rubefacient and as an application in rheumatism and pains from over-fatigue: a small quantity is exported from the forests and pays a duty of five rupees per maund.

Prunus Communis, var. domestica, Linn.—Prune. See page 712. The dried drupe is considered a laxative and emollient and is used in medicinal confections. Pharm., 86. The *alu-bukhára* is used as a refrigerant and laxative both in a cold infusion and a confection. *P. persica*—the peach—is given as a demulcent and antiscorbutic and stomachic. The oil from the kernels is considered a valuable vermifuge and strengthener of the hair. The kernel of *P. Puddum* is used in stone and gravel, and that of *P. Padus* yields a poisonous oil, like oil of almonds, much used in medicinal preparations.

Psidium Guyava, Linn.—Guava—*Amrúd;* described by Baker in Hooker, II., 148. The bark of the root is given in decoction in infantile diarrhœa and the young leaves as a tonic in diseases of the digestive functions. Pharm., 92.

Pueraria tuberosa, D.C.; *Hedysarum tuberosum*, Roxb.—*Bilái-kand, bili, biráli-panwa* (Kumaun), *sural* (Jaunsár), *sarár, sarwála* (Bijnor); described by Baker in Hooker, II., 197. The tubers are dug up and exported in large quantities to the plains, where they are considered demulcent and refrigerant in fevers and useful as a cataplasm for swollen joints.

Punica Granatum, Linn. –Pomegranate—*Anar* (cultivated); *dárim* (wild); *naspál, kushkála* (rind of fruit). The root-bark and dried rind possess powerful astringent properties from the presence of tannin. The former is considered anthelmintic in European practice and the latter astringent. See Pharm., 93, 447.

Putranjiva Roxburghii, Wall.—*Júti, putrajiva;* described by Drury (U. P., 372). Given in decoction in colds and fevers.

Pyrus Cydonia, Linn.—Quince—*Bihi.* See page 713, *Cydonia vulgaris.* The seeds are used as a demulcent in native practice and as a tonic; also in decoction in dysentery and special diseases: Pharm., 86.

Q.

Quercus incana, Roxb.—*Bánj;* described by Brandis, 482. The acorn (*sil-supári*) washed and powdered is used as an astringent in indigestion, diarrhœa, and asthma. Pharm., 209.

R.

Randia dumetorum. Law.—*Mainphal, manyál, karhar;* described by Drury (U. P., 373). The fruit is highly esteemed as an emetic and is used to poison fish and the bark of the root in infusion to nauseate. Pharm., 118.

Raphanus sativus, Linn.—Radish—*Múli.* The seeds of this common vegetable have diuretic and laxative properties and the roots are prescribed in native practice for special and urinary diseases.

Rheum emodi, Wall.—*Dolu.* This species is found near the Pindari glacier and at similar elevations in Kumaun and Garhwál; the average annual export from the Kumaun forest division is about 1,000℔. This and *R. Webbianum,* Royle, are used as a substitute for Turkey rhubarb. *R. emodi* is less active as a purgative and more spongy in texture. See Pharm., 187 : O'Shaugh., 519 : Panjab Products, 370 : J. A.-H. Beng., I., 76 : Birdwood, 70 : Pereira Mat. Med., II., 485.

Rhododendron campanulatum, Don.—*Chimúl;* described by Brandis, 281. The leaves are exported to the plains, to be made into a snuff called *kulús-kashmíri*, useful in colds and headaches.

Ricinus communis, Linn.—Castor bean—*Rendi.* This well-known plant yields the medicinal oil used as a purgative, &c. Pharm., 201, 462 : O'Shaugh., 556 : Drury (U. P., 375).

Roylea elegans, Wall.—*Tít-patti, kauri.* The leaves are used as a bitter tonic febrifuge.

Rubia cordifolia, Linn.—*Majethi.* The natives consider the roots most useful in cases of poisoning, cutaneous eruptions, dysentery, and as a tonic to promote menstruation. Pharm., 118 : Drury (U. P., 379).

Rumex acutus, Roxb.—*Jangli pálak ;* described by Drury (F. P., III., 49). This plant has cooling properties : the leaves are applied to burns and the seeds are applied as the *líj-band* of the bazars. *R. acetosa* is also widely distributed and known under the same vernacular name and also as '*Almora*,' whence the name of the capital of Kumaun, as Mussooree is derived from the vernacular name of *Coriaria nepalensis*.

S.

Salix tetrasperma, Roxb.—*Gar-byush ;* described by Brandis, 462. The bark in decoction is of some account as a febrifuge. Pharm., 213 : O'Shaugh., 606.

Saxifraga ligulata, Wall.; Var. *ciliata*, Royle. The roots of this and perhaps *P. Kurrua* (*antea*) and *G. Kurroo* (*antea*) are all exported to the plains as *pákhán-bhed* or *páthán-bhed* and *jintiána* and are used as a tonic in fevers and also in diarrhœa and coughs and as an antiscorbutic. The average annual export from the Kumaun forest division is about thirty maunds.

Sapindus detergens, Roxb.—*Kanmar, rítha;* described by Drury (U. P., 393). The nut is used externally in cutaneous affections and internally in epilepsy and headache and as an expectorant; also in the arts as a detergent. It is exported from the Kumaun forest division to the extent of about twenty tons per annum.

Scindapsus officinalis, Schott.—*Gaj-pípali, háth-ungliya.* The dried and sliced fruit has stimulant, diaphoretic, and anthelmintic virtues. Pharm., 250.

Semecarpus Anacardium, Linn., *F.—Bhiláwa, bhaliau, bhála;* described by Hooker, II., 30. The acrid viscid juice between the laminæ of the shell possesses powerful caustic properties and is used as a vesicant.: see further Pharm. 60: K. Dey, 105. The average annual export from the Kumaun forest division is about five maunds.

Sesamum indicum, Linn.—*Tili.* See page 764. This plant furnishes the sesamum or sweet oil, used as a substitute for olive oil in native practice. Pharm., 151: Drury (U. P. 402): O'Shaugh., 479.

Sesbania ægyptiaca, Pers.—*Jaint;* described by Baker in Hooker, II., 114. The seeds have stimulant and emenagoguic properties and are used in cutaneous diseases and itch: the leaves are used in poultices to promote suppuration, and the juice of the bark internally as an antiscorbutic.

Shorea robusta, Roxb.—*Sál;* described by Drury (U. P., 405). The resin (*rál* or *dhamar*) is an efficient substitute for pine resins in plasters: in native practice, the resin is taken internally in special diseases and applied as a styptic to wounds. Pharm., 33.

Solanum indicum, Linn.—*Katang-kári;* described by Drury (U. P., 408). The root is used in decoction in dysuria and in fevers and coughs: and when powdered as an anodyne. The juice of the leaves boiled with ginger is used to stop nausea. Pharm., 181.

Solanum tuberosum, Linn.—*Alu.* The tubers are occasionally used as a substitute for salep.

Solanum esculentum—*Baigan, bhutta.* See page 703. The leaves possess narcotic properties: nearly every species of this genus in Kumaun affords some aid to the native Materia Medica. Pharm., 181.

Spondias mangifera, Pers.—Hog-plum—*Ambara*; described by Hooker, II., 42. Tho bark is used in dysentery and a decoction of the wood in special diseases; the juice of the leaves forms an application in earache and the gum and fruit are eaten.

Sterculia urens, Roxb.—*Kuli, kulu*; described by Masters in Hooker, I., 355. The leaves and tender branches steeped in water yield a mucilaginous extract useful in pleuro-pneumonia in cattle.

Streblus asper, Lour.—*Sihora, rúsa*; described by Drury (U.P., 211). The milky juice is applied to cracked heels, sore hands, and has astringent and septic qualities. The bark in decoction is given as a lotion in fevers.

Symplocos cratægoides, Ham.—*Lod, lodh*; described by Brandis, 299. The leaves are considered astringent and are used in diarrhœa and as an application to fresh wounds and the bark in tanning. About nine tons are exported every year from the Kumaun forest division.

T.

Taxus baccata, Linn.—Yew—*Thúner, bráhmi*; described by Brandis, 539. The leaves are used in native practice in epilepsy and indigestion.

Tephrosia purpurea, Pers.—*Sarphonka*; described by Baker in Hooker, II., 123. The leaves and seeds possess astringent, tonic, febrifugal properties. The leaves of *T. candida*, the *lehtiya* of Kumaun, are used to poison fish.

Terminalia Chebula, Retz.—*Hár*; described by Drury (U.P., 431). This and other species of the same genus yield nuts much used in medicine and the arts. See Pharm. 89 : K. L. Dey, 117 : Birdwood, 34.

Tetranthera laurifolia, Jacq.—*Gar bijaur, meda-lakri*; described by Brandis, 379. The oil from the berries is used in rheumatism; the bark triturated in water or milk, or even dry, is applied to bruises and is given internally in infusion in diarrhœa; the leaves have a rich aromatic odour. Pharm., 88 : O'Shaugh., 548.

Thalictrum foliolosum, D.C.—*Pila-jari, pengla-jari, barmat*; described by Hooker *f.* and Thomson in Hooker, I., 14. The roots are exported from Kumaun under the name *mamíra* and are highly alued in ophthalmia and as an antiperiodic. Pharm., 5.

Tinospora cordifolia, Miers—*Gulancha;* described by Hooker *f.* and Thomson in Hooker, I., 97. The stems yield the well-known extract known as *gulancha* or *giloi,* a much-esteemed specific in stings as well as infever and rheumatism. The leaves bruised and mixed with honey are applied to ulcers, with oil to the head in neuralgic affections, and in decoction for gout. The extract is made from the root by boiling for twelve hours and then straining and evaporating the water. The annual average export of the extract from the Kumaun forest division is about two maunds. Pharm., 9, 435.

Toddalia aculeata, Pers.—*Kanj;* described by Hooker, I., 497. The root-bark has tonic, stimulant, and anti-periodic properties. Pharm., 47, 442.

Trichodesma indica, R. Br.—*Ratmandi.* The natives consider it to be an antidote in snake-bites; the leaves are used as a poultice and in cold infusion as a purifier of the blood. Pharm., 158.

Trichosanthes palmata, Roxb.—*Indráyan;* described by Clarke in Hooker, II., 606. The roots and fruit are poisonous and are used in pleuro-pneumonia in cattle. Pharm., 96. *T. cucumerina,* Linn., gives seeds, tender shoots, and dried capsules, all of which are used as medicine. O'Shaugh., 351.

Trigonella Fœnum-græcum, Roxb.—Fenugreek—*Methi;* described by Baker in Hooker, II., 87. The seeds are stimulant, aromatic, and laxative, and are given in colds, coughs, diarrhœa, and special diseases.

Typha angustifolia, Linn.—*Boro.* The down of the ripe fruit is used as an application to burns and the lower succulent parts of the stem to clear muddy water.

U.

Urginea indica, Kunth.; *Scilla indica,* Roxb.—*Iskíl, kúndri* or *kunda* of Bijnor and *ghesuwa* of Kumaun; described by Drury (U. P., 399). It is exported largely from the lower hills. The nauseous bitter young bulbous roots have expectorant and diuretic properties in small doses, and in large doses they are emetic and cathartic. Pharm., 241: K. L. Dey, 104.

V.

Vallaris dichotoma, Wall.—*Dúdhi;* described by Drury (P. F. II., 198). The juice is applied to wounds.

Valeriana Hardwickii, Wall.—*Shumeo, asárun.* The roots are exported and are said to possess anti-spasmodic properties: when dry they are burned as a perfume, and are also used as a flavoring agent and to keep off insects from clothes. Pharm., 120.

Vernonia anthelmintica, Willd.—*Káli-jíri;* described by Drury (U. P., 449). The bitter seeds are powerfully diuretic and anthelmintic and are given in infusion in coughs and flatulency. Powdered and mixed with lime-juice they are used to expel vermin from the head, and mixed with oil in scabies and anasarca and in plasters for abscesses. Pharm., 126.

Viola serpens, Wall.—*Thungtu, banafsha;* described by Baker in Hooker, II., 184. The flowers are considered diaphoretic and laxative: the seeds are diuretic and the root emetic (like ipecacuanha) and purgative (Brown).

Vitex Negundo, Linn.—*Shiwáli, simáli, filfil-bári* (fruit); described by Drury (U. P., 452). The root and fruit have anodyne, diuretic, and emenagoguic properties, and the leaves are given in colic. Exported from Kumaun. Pharm., 163: O'Shaugh., 484.

W.

Withania somnifera, Don.—*Asgand* (root); described by Drury (U. P., 355). The leaves are bitter and narcotic and are used in infusion in fever: the seeds coagulate milk and the roots are aphrodisiac and diuretic. Pharm., 182: O'Shaugh., 466. The seeds of *W. coagulans,* Don., have also sedative properties and are given in colic. Both are exported from Kumaun.

Woodfordia floribunda, Salis.; *Grislea tomentosa,* Roxb.—*Dhaula, dhái;* described by Clarke in Hooker, II., 572. The dried flowers are used as an astringent tonic in affections of the mucous membrane, hœmorrhoids, and bilious complaints. The leaves are also officinal in native practice. Exported from Kumaun.

Z.

Zanthoxylum alatum, Roxb.—*Tejbal, timúr;* Sansk. *jwarántika,* 'fever ender'; described by Hooker *f.* and Thomson in

Hooker, I., 193. The bark and seeds are used in native practice as a tonic in fevers and bowel complaints: the small branches are used as toothbrushes and the thorns as an application in toothache: the fruit is used to intoxicate fish. Supposed to possess generally stomachic and carminative properties. The average annual export from the Kumaun forest division is about half a maund. Pharm., 48.

Zingiber officinale, Ros.—Ginger—*Adrak, sonth.* This well-known plant yields the ginger of commerce, extensively used in medicinal preparations. See Pharm., 228.

B.—NARCOTICS AND SPIRITS.

Tobacco, opium, hemp, and the preparations made from them, are the principal vegetable substances used for their narcotic and intoxicating properties in these provinces, but to them we may add the various forms of alcohol obtained by distillation and the preparations of betel and areca. The use of tobacco in the plains is universal amongst males from their twelfth year, and the practice has so far entered into the social arrangements of the people that few matters of importance are discussed without the *hukka* being passed around. In the hills tobacco-smoking is becoming more common every year, and now, perhaps, all except a few Brahman families smoke tobacco either pure or mixed, and these even chew the leaf pounded with lime, a practice common to every caste. Opium is principally consumed by Musalmáns, and its use in the hills is very limited. The preparations of hemp are in great request amongst Hindús, and are much indulged in by Jogis and others of the wandering religious mendicant classes. Spirits are consumed chiefly by the lower castes of Hindús. Brahmans and Baniyas profess to hold it in abhorrence, and the use of it is forbidden to Musalmáns by the Koran. As a general rule these restrictions are observed, but still there are very many individuals of these classes who openly disregard the rules of their religion and many more who do so in secret. The statistics derived from the Excise Department would otherwise be inexplicable. Still, taking into account the quantities of opium, hemp, and spirits that must be consumed in a country like India without paying any license or contributing in any way to the revenue, there is only a moderate consumption on the whole. It has often been observed that you may pass through any fair or assembly, except during the Diwáli, the Hindu carnival, without seeing a drunken man, and there can be no doubt but that the consumption is very small and quite insufficient in the hills, at least, to have much effect upon the public health. Although hemp is produced in such quantities in Garhwál and Kumaun, the preparations from it are not a favourite form of intoxication in the hills and are seldom used by the permanent inhabitants.

TOBACCO.

Nicotiana Tabacum, Linn. Tobacco—*Tamáku, dhamóku.*

Tobacco.

Tobacco is raised in large quantities in the forest clearings along the foot of the hills, where the conditions necessary—a rich alluvial soil, warmth, and abundance of manure—exist. The last is furnished by the cattle which are sent there for grazing in immense numbers from November until May. In the Garhwál Bhábar the cultivation of tobacco is carried on by men of the gardener caste from the plains, who remain long enough to plant and gather the crop. The indigenous Bhuksas of these parts consider that they are prevented by their caste rules from growing tobacco, or rather are too indolent to undertake its cultivation. Further east all classes cultivate the plant, and great quantities are exported to the plains from the Kumaun Bhábar and the Tarái. The quality of the leaf is not so delicate as that of the better sorts of the plains varieties, but the quantity produced from a given area is greatly in excess of that raised elsewhere. In the hills, a far superior variety is cultivated from Jaunsár to the Káli, but not in quantity sufficient to be of much commercial importance. That grown on both banks of the Alaknanda near Srinagar in Garhwál is specially esteemed. The Kumaun vernacular names above given represent two varieties, *N. Tabacum* and the *N. rustica* or Latakia, which latter seems to have been grown in the hills from time immemorial, and when carefully prepared is palatable to Europeans. Dr. Stewart, writing of its cultivation in the western Himálaya, states that "more of it than of the ordinary kind can be grown per acre, especially as in many places the flowers are not plucked off, but are mixed with the leaves for smoking, and it brings in a greater price than the ordinary species. It is said to be much stronger than the latter and to be generally smoked mixed with a large proportion of it. Its qualities when smoked in the European pipe give assurance that, if properly cured, it would rival Turkish tobacco." Some efforts have been made lately by Mr. E. C. Buck to improve tobacco cultivation in Kumaun, but the experiments have failed and their history will be found in the annual report of the Department of Agriculture and Commerce.

The Sikhs, Wahábis, and certain Hindu sectaries are forbidden the use of tobacco by their religious guides, but the first console themselves with the preparations of hemp and the second use opium. The earliest mode of procuring and inhaling the smoke was to make two holes in the ground, in one of which the fire and tobacco were placed and a pipe connected the two. The smoker then crouched on the ground and sucked the smoke through the second hole. This method may still be seen in the hills. Another mode was to twist a leaf and smoke through the narrow end, still a favourite with coolies in the hills. An improvement was then effected by drawing the smoke through a bambu, and thus avoid the uncomfortable crouching position, and eventually the *hukka* was invented. The cocoanut served as the first form of the *hukka*, and though metal is now used for the receptacle for water and the original form has been modified, the cocoanut is still the basis of all the forms of the *hukka* from the elaborate and costly *pechwán* of the nobleman to the simple pipe of the cooly. Musalmáns seem to affect those *hukkas* that have stands, whilst Hindûs adopt the round or oval shape, which are fitted chiefly to pass from hand to hand. In the plains tobacco is seldom smoked in its pure state (*sáda*), but is mixed with from a half to an equal weight of molasses, either of the sort known as *gúr* or that known as *shíra*, to which a little *saji*, or impure carbonate of soda, is added. In the interior of the hills, however, the pure leaf is generally the only sort procurable, but in the principal bazars the fashionable mixtures may be obtained. One of these in high repute amongst the wealthy is known as *khamera* and consists of a certain quantity of tobacco of the Latakias sort, to which is added the sence of the *Pandanus odoratissimus* or *keora;* the dried leaves of the musk-plant, *Delphinium brunonianum;* sandal-wood dust; a conserve of roses known as *gúl-kand;* the fruit of the *Zizyphus jujuba;* apple-preserve, cardamoms, and the wilted leaves and stems of the betel palm known as *piuri*, in certain proportions kept secret by each maker and which form his particular brand or manufacture. Snuffing tobacco, though not unknown, is rarely seen. Its use, however, as one of the ingredients of 'betel' should perhaps come under the head of chewing.

OPIUM.

Opium.

Papaver somniferum, Linn.—Poppy—*Post, posta;* juice of the capsule, opium; *afyún, afím*. A plant belonging to the natural order *Papaveraceæ.* The cultivation of the poppy is a Government monopoly and is chiefly confined to the plains. The capsules, whilst immature, yield by incision a juice which on solidification is known as the opium of commerce. When ripe or dried they yield an intoxicating liquor by inspissation. The use of the drug was known to the ancients, and some say that it was the *pharmakon nepenthes* of Homer. Dr. Royle considers that it was introduced into India from Persia, and in this suggestion he may, perhaps, be correct, as the common names for opium are of Persian origin. The *Aín-i-Akbari* refers to theo pium monopoly in Sirkárs Kora (Fatehpur district), Allahabad, and Gházipur in the time of Akbar, and we know that from time immemorial the opium poppy has been cultivated in Nepál and Kumaun.

The three principal preparations of poppy in use are the abkári or excise opium, *madak* and *chandu.* The first is supplied from the Gházipur factory and is sold at the rate of sixteen rupees per seer of eighty tolas. As a rule, *abkári* opium is taken in the form of pills, but many soak the preparation in water for some hours and drink the solution thus formed, leaving the impurities at the bottom of the cup: very moderate consumers take about one tola or 180 grains Troy or 11·662 grammes per month, and the average consumption of habitual opium-eaters may be set down at five tolas each per mensem. In some cases as much as two tolas a day are taken boiled in milk. Opium-smoking has of late years increased very much in these provinces. The results are the same as in other countries, the drug inducing stupor, reverie, and voluptuous listlessness. Still the individual can easily be roused to business, and, unless taken in excess, the effects are not more injurious or lasting than those attendant upon a too liberal indulgence in spirituous liquors. The temptations to excess are, perhaps, stronger in the case of opium, and with over-indulgence come sickness, constipation, indigestion, want of appetite, emaciation, impotency, and premature old age. In small doses as far as one grain, opium when eaten acts as a stimulant, increases the pulse in strength and frequency, and excites the mind by a happy train of thought. It is believed to promote digestion, and for this purpose it is taken usually in the afternoon or evening, so that its effect may come on before the time for the evening meal. This condition is however succeeded by drowsiness, thirst and loss of appetite, and the habitual eater then increases his dose, when after a smoke of tobacco from the *hukka* the excitement again begins and is followed by a period of stupor and eventually a profound sleep, "the pupils are slightly contracted, the pulse slow and full, the breathing slow, and the temperature of the body somewhat increased." Beyond four grains to healthy persons not accustomed to opium it may be considered to act as a poison. Milk is taken by opium-eaters to keep the bowels open, and as in the case of *bhang* and, indeed, spirits when once the habit of using the drug has been fixed, it is almost impossible to shake it off. Kahárs and men who have much trying physical labour to get through in a short space of time can, frequently, take large doses without apparent injury.[1]

***Madak* and *chandu*.**

Madak and *chandu* are forms of opium extensively used in these provinces. In preparing them the opium is first reduced to a watery extract, which is then strained two or three times through cloth and afterwards boiled over a slow fire until it thickens somewhat. The impurities left in the process of straining are again washed and strained two or three times to extract any portions of the active principle which may remain. The refuse, called *joga*, is then thrown away and the residuum of pure extract of opium that remains is called *kimam* and forms the basis of both *madak* and *chandu*. One ser of excise opium yields a little more than half a ser of *kimam*. To make

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[1] I am indebted to several sources, official and private, for these notes on opium and hemp.

madak, the leaves of the guava, *pán*, or, in some cases, the rose are collected and cut into very fine pieces and then boiled in water. When they become soft they are strained in a cloth and dried and then fried on an iron pan over a slow fire. These leaves thus prepared are called *jesu*, and equal quantities of *jesu* and *kimam* form *madak*. This preparation is made up into small pills about the size of a pea, which sell in the retail shops for a pice each. The consumer buys these pills, breaks one of them into six to twelve parts, which are called '*chittas*,' each of which serves for one operation or whiff. The ordinary *hukka* is used, but the *chillam* or upper portion for receiving the drug and fire is much smaller. The *chitta* is placed on the *chillam* and lighted by a charcoal pencil, and the smoke is taken inwards in one inspiration and swallowed. The result is considerable pleasurable excitement, which as it begins to wear off is renewed by consuming another *chitta* until satiety is produced. One pill is sufficient to intoxicate a new smoker, but many consume a dozen pills with impunity.

Chandu.

The basis of *chandu* is the same *kimam* from which *madak* is made, but instead of leaves the half-burned ashes of the *chittas* of *madak* are mixed with the *kimam* in equal quantities and the resulting compound is called *chandu*. For this preparation there is a particular pipe made of wood and about twelve to fifteen inches long. A small brass or tin bowl is fixed towards one end and communicates with the stem by a small aperture. The *chandu* formed into a paste and made up into pills is placed in the bowl, and this is lighted from a lamp and gives a gurgling noise while burning. The smoker reclines on a pillow with his eyes closed, and the pipe is lighted by an attendant and refilled when necessary. Like the *madak*-smoker, the *chandu*-smoker takes in all the smoke arising from one application of the *chandu* by one deep inspiration and swallows it. After every inspiration there must be a rest, and the heated tongue is moistened by chewing sugarcane or by the application of a rag moistened in sherbet. Two or three applications are sufficient to affect a beginner, but there are many who can doze away over pipes of *chandu* the whole day. The effect of *madak* and *chandu* smoking is equally pernicious with opium-eating, with this difference that intoxication supervenes at a much earlier period, because the smoke containing the active principle of the opium is directly absorbed by the blood in the lungs, and being carried into the circulation acts, at once, on the brain; whilst in eating opium the process of solution, absorption, and digestion is much slower. Muhammadans are by far the greater smokers and eaters of opium as compared with the Hindús, and they make up by indulgence in this vice for the prohibition of spirituous liquors. Love of sexual intercourse has much to do with inordinate indulgence in opium, and for a time, like the preparations of hemp, it acts as a powerful aphrodisiac, but in the end it induces impotency and leaves the opium-drunkard a physical and moral wreck, utterly careless for the present or the future and a mere semblance of a human machine.

HEMP.

Cannabis sativa, Linn.—Hemp—*Gúr-bhanga* (female plant), *phúl-bhanga* (male plant). (See FIBRES *postea*.)

Hemp.

The principal parts of the hemp that are used as intoxicating agents are the *charas*, *gánja* and *bhang*, or *sabji* and their preparations. The best *charas* is obtained from the female plant and consists of a resinous exudation from the leaves, stems and seeds when ripe, and is collected from them by rubbing them in the hands or on the naked thigh or by scraping the resin from the plant with a blunt iron knife. The quantity and quality of this resin differs with the soil and locality. In some places the plant developes a woody tissue, whilst in others the bark splits and a resin is secreted. In the plains in many places the hemp plant yields excellent *gánja*, but neither *charas* nor *bhang*; and again in the hills the *charas* is the principal product. The best qualities of *charas* are imported from Yárkand, Bukhára, and Afghánistán. In former times only the pure resin collected by the scraping process was imported, but now a system of manufacture has sprung up by which a much larger return is effected. When the plants have arrived at maturity, which is known by the bark commencing to split, they are cut down and soaked in water and when well moistened the resinous juice is pressed out. This is then boiled and reduced to the consistence of a paste, in which form it is imported by the Afghán fruit-sellers. It contains, in addition to the resin, much of the juice of the plant, its colouring matter and other foreign substances, and is altogether inferior to the resin collected by the old scraping process. The Kábulis sell this preparation to the contractors at about one and a half rupee per ser, and they again to the licensed vendors at from four to five rupees per seer, and the latter retail it at about two *chhat-táks* for a rupee or eight rupees a seer. The drug is consumed in the following manner :—About the weight of a two-anna silver piece or 22 grains Troy is taken and covered up with twice its weight of prepared tobacco in the shape of a ball. This is dried over a charcoal fire, and during the process the *charas* melts inside. The dried ball is then reduced to powder and mixed with tobacco is placed on the *chillam* of an ordinary coconut *hukka* and smoked in the same way as tobacco. *Charas* seems to be a milder form of the drug than *gánja* and is used by the better class of people and those who do not care for intoxication pure and simple.

GÁNJA.

Gánja.

Gánja consists of the dried flower heads and smaller leaves from which the resin has not been removed. It yields to alcohol twenty per cent. of resinous extract composed of the resin (*charas*) and green colouring matter. Distilled with a large quantity of water traces of essential oil pass over, highly odoriferous of the drug. The colour of the bundles of *gánja* is dusky green, the odour narcotic and the touch adhesive. The *gánja* produced in Kumaun and Garhwál is considered of little value and is not, so far as I am aware, exported. The *gánja* consumed locally is imported from the lower districts. Two sorts of *gánja* are sold in these provinces—the *pattar* and the *bilúchar*. The *pattar* is imported chiefly from Holkar's territories and is of quality inferior to the Bengal *gánja*. It is purchased at from five to six rupees per maund in Indúr in the rough state, including the stalks and useless leaves, and also pays a duty of about four annas per maund on exportation to British territory. The farmer of the drug revenue pays the cost of carriage and sells it to the licensed retail vendors at from Rs. 20 to Rs. 22 per maund. The retail sellers separate the real *gánja* from the rough plant and throw away the refuse, which amounts to from five-eighths to two-thirds of the whole, or in one maund of rough plant *only* thirteen to fifteen sers of real *gánja* will be found. This sells at from three to four rupees per ser, and about one quarter of a ser will form a month's supply for an ordinary smoker. This *pattar gánga* is chiefly consumed by the lower classes of Hindús, and especially by all the mendicant sects of Bairágis, Nágas, Sanyásis, &c.

The *bilúchar* variety is imported from Lower Bengal and is far superior to the *pattar*. It is grown in the Rajsháhi district and sells there in the rough at from Rs. 18 to Rs. 22 per maund. The Bengal Government charge a duty of from Rs. 2 to Rs. 2-8 per ser, or Rs. 100 per maund, on all exports of *gánja* to these provinces. The farmers of the drug revenue separate the real *gánja* from the rough plant and sell to the licensed retail vendors at from Rs. 10 to Rs. 12 per ser, and the latter retail the drug at one rupee per chhaták (1oz. 17dwt. 12grs. Troy), so that Bengal *gánja* is as dear as excise opium in these provinces. One or two chhatáks are sufficient for a month's consumption to an ordinary smoker. The Bengal *gánja* is much stronger than the *pattar* variety, so that a much smaller quantity produces the same result. It is used only by the better classes, being the more expensive of the two. *Gánja* is not in general used so much as tobacco. Kahárs when they complete a portion of their journey often take it as a stimulant, and others with weak digestions smoke a little before a meal to excite a feeling of hunger and promote digestion. It may serve as a stimulant for the time, but its after-effects are lassitude and depression. *Gánja* is also used as a sedative to promote sleep, which it does after an interval of excitement by intoxication.

Gánja is prepared for smoking by taking a portion of the dried leaves, say 20 grains in weight, in the palm of the left hand; these are rubbed with the right thumb, a few drops of water being added to moisten it. Then an equal quantity of dry but soft tobacco leaf is added, and the whole is formed into a paste. This is then cut into thin layers with a knife and again rubbed and pressed into a paste with more water. The compound when well mixed is again sliced, and the process is continued two or three times until the *gánja* and tobacco are thoroughly amalgamated. It is then smeared with the fingers over a very narrow, small, earthen *chillam*, and a small cake of lighted charcoal is placed on the top. The *chillam* is placed on the ordinary hukka, consisting of a hollow wooden cylinder fitted into a dry cocoanut shell which is half full of water; another cylinder attached to the middle of the cocoanut forms the stem through which the smoke is swallowed. *Gánja* smokers are, as a rule, sociable, and the pipe is passed around after each one has had one good pull at it. Each smoker swallows the smoke, which conveys the active principle in that form to the lungs and stomach. With strong Bengal *gánja* it is difficult to retain all the smoke inspired at a single time, and a cough usually interrupts the operation. This custom is as much due to economical considerations as to good-fellowship, for no one could smoke time after time and the *gánja* keeps burning away all the same. One dose of *gánja* is quite sufficient to give a moderate feeling of intoxication to four or five persons. To those unaccustomed to it a single inspiration produces giddiness and even stupor for a time, whilst habitual smokers can take their turn for half an hour. Heaviness, laziness and agreeable reveries ensue, but the person can be readily roused and perform routine duties. As in the case of opium, *gánja* is often made use of as an aphrodisiac.

BHANG.

Bhang.

Bhang comprises the larger leaves and capsules of the hemp without the stalks. In these provinces there are three varieties of *bhang* in common use, *viz.*, the Hardwár *bhang* which comes from Garhwál, the Oudh which comes from the Gonda district, and the Panjábi which comes from Jalandhar. Of these the Oudh variety is the strongest and therefore the best, so much so that one part of it intoxicates as quickly as two parts of the other varieties. The *bhang*-producing hemp grows wild and is sold in the rough with the stalks and refuse leaves at about one rupee per maund in the producing districts, but to this must be added the cost of carriage. The farmer of the drug revenue sells the cleaned plant to the licensed vendors at from ten to fifteen rupees per maund according to the distance from the base of supply. The latter retail the drug to consumers at eight annas per ser or Rs. 20 per maund. The names *sabji* and *sidhi* are, also, applied to *bhang* in its green state, and *májum* is a conserve of *bhang* which is noticed hereafter.

Bhang is prepared for use by soaking the dried leaves for a time in cold water and carefully washing and freeing them from all sorts of impurities, such as dust, seed, kunkur, and the stalks and stems. The leaves are then bruised in a mortar or on a flat stone and made into a thick paste. The paste is then ready for use, and when required is diluted with water according to taste and the solution is drunk. Many persons mingle spices with the paste during the pounding operation, such as black pepper-corns, aniseed, cloves, cardamoms, sugar, and melon and cucumber seeds, but the pepper forms the principal ingredient. An ordinary drinker will consume one ser of *bhang* or eight annas worth per mensem. Most Hindús who do not indulge in wine, such as Brahmans, Baniyas and the like, take *bhang*. It is the special drug of the Hindu mendicant classes as *madak* is affected by the Musalmán fakírs. The Chaubes of Muttra, the Pragwáls of Allahabad, and the Gangaputras of Benares, are noted for their indulgence in excessive *bhang*-drinking. In the Panjáb, the Bhangi *misl*, or sub-division of the great Sikh confederacy, was so called from the real or fancied fondness of its members for the use of the drug. *Bhang* taken in moderate quantities is exhilarating and tonic : it creates an appetite and promotes digestion. In large doses, when the intoxication is severe, its effects are very remarkable : the patient is raised to a state of ecstacy and cares neither for his own life nor the lives of others. Sometimes he cries in a delirium of joy and then again breaks out into exulting laughter. Even in moderate doses its effects are noteworthy. Dr. O'Shaughnessy made several experiments to ascertain the effects of the drug on men and animals, and in the course of them several of his pupils commenced experiments on themselves which are thus reported :—"In all, the state of the pulse was noted before taking a dose, and subsequently the effects were observed by two pupils of much intelligence. The result of several trials was that in as small doses as the quarter of a grain, the pulse was increased in fulness and frequency ; the surface of the body glowed ; the appetite became extraordinary ; vivid ideas crowded the mind ; unusual loquacity occurred ; and with scarcely any exception great aphrodisia wás experienced. In one pupil, Dinonath Dhar, a retiring lad of excellent habits, ten drops of the tincture, equal to a quarter of a grain of the resin, induced in twenty minutes the most amusing effects. A shout of loud and prolonged laughter ushered in the symptoms, and a transitory state of cataleptic rigidity occurred for two or three minutes. Summoned to witness the effects, we found him enacting the part of a Raja giving orders to his courtiers; he could recognize none of his fellow-students or acquaintances; all to his mind seemed as altered as his own condition; he spoke of many years having passed since his student's days; described his teachers and friends with a piquancy which a dramatist would envy; detailed the adventures of an imaginary series of years, his travels, his attainment of wealth and power. He entered on discussions on religious, scientific, and political topics with astonishing eloquence, and disclosed an extent of knowledge, reading, and a ready apposite wit which those who knew him best were altogether unprepared for. For three hours and upwards he maintained the character he at first assumed, and with a degree of ease and dignity perfectly becoming his high situation. A scene more interesting it would be difficult to imagine. It terminated nearly as abruptly as it commenced, and no headache, sickness, or other unpleasant symptom followed the innocent excess. Dr. Goodeve and more than thirty students were present at this occurrence. In the symptoms above described, we are unavoidably led to trace a close resemblance to the effects produced by the reputed inspiration of the Delphic Oracles; perhaps it would not be very erroneous to conclude that it was referable to the same kind of excitement."

MÁJUM.

Májum.

Májum or conserve of *bhang* is a preparation much affected by the better classes. In one maund of *májum*, as used in these provinces, there are three sers of *bhang*, two sers of *ghi* or clarified butter, and thirty-five sers of sugar. It is prepared in this way:—take three sers of clean *bhang* and soak it for a night in cold water; next morning take out the *bhang* wash it well and put it into a basket, to allow the water to drain off. Then place a large shallow iron-pan on a slow fire and throw into it about two and a half sers of good *ghi*. When this melts and begins to boil throw into it the *bhang* and fry it until it becomes crisp. Then add water and boil for some hours until the *bhang* becomes soft and pulpy. Then strain through a cloth and pound in a mortar until a paste is made. You next take a maund of sugar and put it in the pan, adding a sufficient quantity of water to melt it. The sugar is then boiled, and while boiling is clarified with milk ; when properly purified the *bhang* paste is added in small quantities at a time and carefully stirred to ensure its mixing with the sugar. When thoroughly amalgamated, the compound is taken out and spread on flat brass plates about an inch thick, and when this hardens by drying, it is cut into small square pieces with a knife. The quantity of *ghi* and *bhang* make up for the loss in clarifying the sugar, and the result is one maund of *májum*. The confection costs about Rs. 18 to 20 per maund and is sold to the licensed vendors at Rs. 40 per maund, and these latter retail it at one pice per square to their customers. Two squares are sufficient to produce a moderate amount of intoxication to an ordinary person. People seldom get used to taking *májum* daily, and it is generally taken for purposes of pleasure and as an excitant to debauch.

Another mode of preparation is as follows :—Four ounces of *sidhi* and an equal quantity of *ghi* are placed in an earthen or well-tinned vessel, a pint of water is added, and the whole is then warmed over a charcoal fire. The mixture is constantly stirred until the water all boils away, which is known by the crackling noise of the melted butter on the sides of the vessel ; the mixture is then removed from the fire, squeezed through cloth while hot, by which an oleaginous solution of the active principle and colouring matter of the hemp is obtained, and the leaves, fibres, &c., remaining on the cloth are thrown away. The green oily solution soon concretes into a buttery mass, and is then well washed by the hand with soft water so long as the water becomes coloured. The colouring matter and an extractive substance are thus removed, and a very pale green mass, of the consistence of simple ointment, remains. The washings are thrown away, for if used they are intoxicating and produce constriction of the throat, great pain, and very disagreeable and dangerous symptoms. The operator then takes two pounds of sugar, and adding a little water, places it in a pipkin over the fire. When the sugar dissolves and froths, two ounces of milk are added ; a thick scum rises and is removed, more milk and a little water are added from time to time, and the boiling continued about an hour, the solution being carefully stirred until it becomes an adhesive syrup, ready to solidify on a cold surface; four ounces of new milk, dried before the sun, in fine powder are now stirred in, and lastly the prepared butter of hemp is introduced, brisk stirring being continued for a few minutes. A few drops of atar of roses are then quickly sprinkled in, and the mixture poured from the pipkin on a flat cold dish or slab. The mass concretes immediately into a thin cake, which is divided into small lozenge-shaped pieces. A ser thus prepared sells for four rupees. One drachm by weight will intoxicate a beginner and three drachms one experienced in its use. The taste is sweet and the odour is very agreeable.

The pure resin of the hemp is very soluble in alcohol and ether, partially soluble in alkaline and insoluble in acid solutions. When pure it is of a blackish grey colour, hard at 90°, softens at a higher temperature and fuses readily. It is soluble in several volatile and fixed oils. Its odour is fragrant and narcotic; the taste is slightly warm, bitterish and acrid. The late Sir W. O'Shaugnessy gives[1] a very interesting historical account of the plant and of the experiments made by him on its properties and uses. Mention of the drug is made by the Sanskrit, Arabian, and Persian writers at a very early date. Some trace a reference to it in the *gánja* mentioned by Manu, but Williams refers the name to the *Abrus precatorius*, whilst giving the adjective *gánjakini* to anything made of hemp. It is noticed as early as 658 H. (1259 A.D.) by Musalmán writers, and was early introduced into Egypt, where, under the name of *hashísh*, it is still eagerly consumed by the lower classes. As in India, its use by religious zealots has led to terrible scenes of slaughter and rapine, so in Egypt, the sect most addicted to it was called the Hashishín or Assassins.[2] Throughout the east, from an early period, it has been used as a medicine and now forms an article of the Indian Pharmacopœia, prescribed in cases of tetanus, hydrophobia, cholera, delirium-tremens, and neuralgia. A careful chemical examination of the different forms of Indian hemp and their preparations is still a desideratum and worthy the attention of the many able chemists residing in India.

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[1] Bengal Dispensatory, 579-604; Waring's Dispensatory ,216. [2] See Yule's Marco Polo, I., 132.

SPIRITS.

Spirits.

The ordinary country spirit is manufactured in all the hill districts. It is made from *shíra* and *gúr*, two forms of the products of the sugarcane. These are placed in a covered tub with water, barley, and certain spices and allowed to ferment. When fermentation has taken place, the tub is filled with water and after two or three days the mixture is ready for distillation. The still in common use is the ordinary rude apparatus of two vessels of metal connected by a tube of bambu. In one the liquor to be distilled is placed and a fire lighted under it; the liquor passes through the tube into the other vessel which is kept cool by being placed in water. This once distilled liquor, known as *tharra*, is of two qualities: the *rási* or weaker and the *phúlka* or strong spirit. If re-distilled the product is known as *makattar*. The process of fermentation takes from ten to twelve days in the hot-weather and double that time in the cold season. The liquor produced from molasses is dearer, but much stronger than that produced from the *mahua*. By one distillation, however, it seldom reaches to 50° under proof by the Syke's hydrometer, but by several distillations spirits even above London proof may be obtained. In Kumaun, as a rule, the use of spirituous liquors is confined to the lower castes, though gradually spreading to the better classes; but in Garhwál the Hindús are less scrupulous, and, according to Traill, all but a few Brahman families drink spirits manufactured there from rice or barley. At the same time, however, they will not drink the spirits manufactured in the plains or after the plains method, objecting both to the materials employed and the caste of the makers. In Garhwál the spirit is made by Rajpúts, not Kalwárs as in the plains. A coarse spirit is also manufactured from *mandua*, and the Bhotiyas prepare another called *dáru*.

BETEL.

Chavica Betel, Miq.—*Pán*. The *pán* is imported from the plains. The leaves are used in chewing and are membranaceous or the adult ones coriaceous, shining above, glabrous on both sides; the inferior ones ovate, broadly cordate, equal-sided; slightly unequally cordate or rounded at the base, five to six nerved. The ingredients in the masticatory in common use are the *pán* leaves;

supári, the nut[1] of the *Areca catechu* or betel-nut palm, a native of the eastern islands and cultivated in Lower Bengal and Travancore ; *chúna* or lime ; and *kath* or catechu, the produce of the *khair* tree (*Acacia catechu*). Women usually add a small quantity of tobacco to the compound and many add the small cardamom. The average quantity consumed by *pán*-eaters is about five leaves a day, costing about one and a half pice, or 2¼ farthings. The mixture is pleasant and refreshing, but like other things its inordinate use is injurious to the digestion. Marco Polo mentions the use of the plant, which he calls *tembal ;* the name of the caste still employed in its sale and preparation is Támboli. The shreds of the unused leaves and the juice of the stalks (*pánri*) are made use of in the preparations of tobacco for smoking.

III.—VEGETABLE SUBSTANCES USED IN MANUFACTURES.

A.—OIL-SEEDS.

The only oil-seeds of importance grown in the Kumaun division and the tract under the hills are the rapeseed and linseed of commerce. The medicinal and other oils have no great value as articles of export and are only procurable in very small quantities. The Bhábar exports great quantities of rapeseed, for which the climate and soil appear to be eminently suited. As so much confusion exists in the synonymy of the mustards, the botanical description of the more important species is given here to aid in distinguishing it.

Brassica nigra, *Koch.* Hook, Fl. Ind., I., 156. *S. erysimoides*, Roxb., Fl. Ind., 499—*Asl rái*, *ghor rái*, *makara rái*, and *bandrasi rái* of Kumaun and *sarshaf* of the hospitals, where the seeds are used for poultices and also in veterinary practice. The leaves are used as a cress. The oil is used chiefly for medicinal purposes.

Brassica campestris, *Linn.*, Hook. Fl. Ind., 156. *S. dichotoma*, Roxb., Fl. Ind., 497.

Erect, lower leaves lyrate, upper auricled, flowers corymbose, beak of pod flat, seedless. An erect, stout, simple or branched, glabrous or slightly hispid annual, 1-3ft. high. Leaves large, petioled, more or less pinnatifid, upper oblong or lanceolate. Flowers large, bright yellow, pedicels ¾in., ascending or spreading. Pods 1½-3in., glabrous, sub-erect; valves with midrib and flexuous veins. Seeds small, smooth, pale or dark.

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[1] This nut is yellow, oval, the size of a small egg, enclosing an oily kernel like a nutmeg, conical, rounded, pointed and marked with white and reddish veins; inodorous, but of a very astringent taste. It contains a large protion of tannic and gallic acids.

Var. *dichotoma*, Roxb., the *jariya, jadiya* of the hills and *lahota laita* of the Bhábar, where it is grown only in a few valleys in Kota, and *káli sarson* of Northern India.

Var. *glauca*, Roxb., the *rára*, *ráda*, *rára-sarson* of Kumaun, *banga-sarson* of Dehra Dún, and *píla-sarson* of Oudh and Rohilkhand: seldom grown in the Bhábar, as it yields a crop good in quality, but poor in quantity.

Var. *glauca*, Royle, the *dain*, *dáin*, and *lai* of Kumaun and Garhwál: sometimes *khetiya*, *tori*, and *toriya* of Northern India, where this variety is in general cultivation: grown very largely in the Bhábar.

The *jariya* variety is sown in the beginning of September in fields where manure has been lying. The stalks are cut from the root and when dry the grain is threshed out and the oil is expressed in the common *kolu* or oil-press. It is a favourite crop near Almora. The *rára* variety is grown all over the hills in small quantities only, as it requires much manure and is liable to injury from hail. It is sown in first-class unirrigated land in November-December and gathered in April. It yields about three maunds of oil to an acre. The *lai* variety is cultivated all over the hills up to 11,000 feet and is the staple mustard crop of the Bhábar. These three varieties are grown as oil-seeds and afford the rape-seed of commerce.

Brassica juncea, H. *f. et* T.: *Sinapis juncea*, Linn.—*Rái, sarson.* There are several varieties of this species. The *S. ramosa*, Roxburgh (498), is the *barlái* of Kumaun, and the *S. rugosa*, Roxburgh (499), is the *bádsháhi-lái* or *bhotiya-lái* introduced by the Gorkhális from Nepál. Both these varieties are cultivated chiefly for their leaves, which are eaten as a vegetable cooked and dressed with spices and clarified butter. The brown seed of *B. juncea* proper, however, yields an oil that possesses properties similar to those of *B. nigra*, and for which the seeds may be substituted in the preparation of poultices. *Eruca sativa*, Lam., the *dúa* and *chára* of Kumaun, is cultivated as a vegetable and also for the oil from its seeds, which is less pungent than mustard-oil. It escapes frequently in cultivated tracts, coming up accidentally with other crops.

Linum usitatissimum, Linn.—Flax; seed is known as linseed—*Alsi, tísi.* An annual belonging to the natural order *Lineaceæ*; seeds oval, pointed in shape, compressed, with a sharp margin; brownish coloured; smooth and shining outside, but white internally. The native country of the flax plant is not known, though it has been thought to be indigenous to Central Asia and has been cultivated for centuries in India. The Indian seed is better for oil and the European seed for fibre. In these hills it is cultivated only for the oil and the oil-cake, which is used as fodder for cattle.

Sesamum indicum, Linn.; the seed is known as *til* and the oil as *mítha tel.* An annual belonging to the natural order *Pedaliaceæ.* There are two varieties known to commerce, the black and the white grain, and a third parti-coloured is found in these provinces. The white-grained called *tili* is cultivated in Kumaun, and the black-grained variety grows wild there and in the Bhábar. As a rule the fresh seed is expressed at once, but in many cases where a finer oil is required the dark colouring matter of the epidermis is removed by bleaching in hot water or washing in cold water several times. The oil produced from these whitened seeds is considered a useful substitute for olive oil in the preparation of medicines and in manufactures. The mode of extracting the oil is usually the same in the hills and Bhábar. The seed is first sifted, cleaned and dried, and then put into a *kolu* or press worked by hand or by oxen. A little water is added, and after some time the oil runs out. The oil is then strained or allowed to stand in shallow vessels, when the impurities sink to the bottom. Every three parts of good seed yield one part of oil, which has risen in price much of late years and renders *til* a very valuable crop. Besides its use in painting and medicine, the oil is burned in lamps, forms a substitute for salad-oil in cooking, and is the basis of most of the perfumed oils in use in India. The last are made by adding one weight of flowers to three weights of oil in a bottle; the mixture is then cooked and exposed to the sun for forty days, when the oil is supposed to be sufficiently impregnated for use. The seeds of sesamum are largely used in religious ceremonies by Hindús, and mixed with sugar in the form of a sweetmeat (*ladu*) forms an appropriate present for old and young at all festivals.

Ricinus communis, Linn.—Castor bean—*Ind*, *rendi*, *arand*. This bean is commonly cultivated in small quantities in the lower valleys for home consumption.

Bassia butyracea, Roxb.—*Chiúra* (Kumaun); the butter made from its fruit is called *chiúra-ka-pína* and *phalel*; the *phalwa* and *phalwára* of Almora. A tree belonging to the natural order *Sapotaceæ*, 30-40ft.: leaves obovate, tomentose beneath : corolla 8-cleft : stamens 30-40 on longish filaments : pedicels aggregate, and are, as well as the calyx, woolly: drupes oval : flowers smallish, white. Roxb. Fl. Ind., II., 527 ; Reprint, 411 : Don. Fl. Nep., 146. Flowers in November. It occurs abundantly in the valley of the Káli, where the bees feed on its fragrant flowers and those of the *javndela* (*Æchmanthera Wallichii*) : hence Sor honey is so esteemed (see page 715). The timber is of little value, the principal product being the 'vegetable butter' extracted from the fruit and which is used as a pomade or cold-cream, also in rheumatism and stiffness of the limbs. Its medicinal properties deserve further investigation (Ind. Phar., 131). It dissolves readily in alcohol, burns without smoke or smell, and makes good soap and candles. Solly's analysis gives solid oil, 34 parts of fluid oil and 6 parts of vegetable impurities (J. Agri.-Hort., Ben., I., 23). It retains its consistency up to 95° and completely melts at 120° and does not become rancid by keeping. The *phalel* is produced by bringing the kernels of the fruit into the consistence of cream, which is then put into a cloth bag with a moderate weight laid upon it and left to stand until the oil or fat is expressed, which becomes immediately of the consistence of lard and is of a delicate white colour (see Roxburgh's description in As. Res., VIII., 477 ; and Drury, U. P., 67). *B. latifolia*, Roxb., *mahua*, occurs occasionally in the Bhábar and affords an oil from its seeds, but is of little economical value here.

The medicinal oils, as already noticed, consist chiefly of sesamum oil impregnated with the various herbs and flowering plants that they are named after or with the different gum-resins. Oils in small quantities made from tea, poppy, and many fruit trees and flowering shrubs were exhibited at Agra in 1867, but owing to the imperfect arrangement of the catalogue no data exist for estimating their value commercially or ascertaining their uses.

B.—DYES AND TANS.[1]

The dyes of vegetable origin in these provinces may be broadly divided into two classes: first, those produced from plants specially cultivated for the purpose; and second, those obtained from plants or trees growing wild or which are cultivated on account of some other product. There are no representatives of the first class in the hills, and to the second class belong turmeric and the great mass of dyes exported from the hills as a portion of the minor forest produce, but which are of little commercial value. The tanning materials of vegetable origin are all the products of trees and plants that grow wild and afford a valuable assistance to the supply of similar materials found in the plains. In neither case, however, does it appear that much can be done in the way of making further use of these substances until their character and qualities have been more thoroughly examined. At present it is believed that, with few exceptions, they do not present any such features as would give good grounds for the hope that they might become of much importance or objects of a regular trade, but until competent persons undertake their investigation it is unnecessary to discuss the finality of this verdict. The local market for either tans or dyes is inconsiderable, and the plains' markets are now filled with the products of the latest discoveries in Europe which in cheapness and quality far surpass the hill materials and are now ousting the local dyes from general use. A demand for bark for tanning purposes will, however, always exist as it would not be profitable to import it.

DYES.

(a.)—Extracted from the root.

Rubia cordifolia, Linn.—Madder—*Majethi*, *manjit*. It should be remembered that the vernacular name *majethi* is sometimes given in Kumaun to *Impatiens Balsamina*, which also yields a red dye, but it is properly applied only to *Rubia*. There are two species, *R. Manjistha*, Roxb. (1,374), abundant 4,000-9,500 feet with black fruit and deep red flowers, and *R. cordifolia*, and both are distinct from the European madder (*R. tinctorum*) and yield a brighter dye, but whether owing to inherent defects or improper appliances the dye is not so durable. It is in common use with the Bhotiyas and gives with alum a reddish-brown colour. Some attempts have been made to introduce the cultivation of the European madder plant, but they were neither continuous nor exhaustive, though successful in Afghánistán and apparently also in Kumaun. The average annual export from Kumaun is about ten maunds.

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[1] For more detailed information on this subject, see "Economic Products of the North-Western Provinces, Part III," Allahabad, 1878.

Curcuma longa, Roxb.—Turmeric—*Haldi* (root). See *Condiments*. This root is chiefly grown as a condiment, but one variety which when cut has a rich unctuous appearance also yields a yellow dye. When it comes into contact with an alkali it turns red, and is seldom used except for the commonest purposes and by the poorer classes.

Berberis aristata, D. C.—*Chitra, totar*. The bark and root of this species and *B. Lycium*, known as *kingora-ki-jar* or *dárhald, dárchob*, yield a yellow dye. They are both common in the Himálaya of these provinces. The colouring principle is found chiefly in the root and affords an excellent dye for leather. The average annual export from the Kumaun forest division is not more than two maunds.

Mariscus cyperinus— *Nagarmotha, panmotha*. The roots are used in dyeing to give a scent to the cloth and also in medicine. Some identify *nagarmotha* with *Cyperus juncifolius*.

Datisca cannabina, Linn.—*Akalbír* (root), *bajr-bhanga* (plant). The yellow root is exported to aid in dyeing red and is also used in medicine.

Hedychium spicatum, Em.—*Kachúr-kachri, Kapúr-kachri*. The root has a strong perfume and is used in dyeing to scent cloth, also to scent tobacco and as a medicine. The average annual export from the tract between the Ganges and the Sárda is about ten tons.

(*b.*)—*Extracted from the bark or stem.*

Acacia Catechu, Willd.—*Khair* (the tree)—Catechu, cutch—*kath, katha* (the dye). The manufacture of catechu or cutch, or terra japonica as it is variously called, has gone on from time immemorial at the foot of the hills. The men employed are of the Dom caste and are called Khairis from the vernacular name of the tree. They continue at work from November until the rains set in and are aided by their families. Madden's description of the manufacture still holds good. He writes :—"One portion of the Khairis is constantly employed in cutting down the best trees, and for these they have to search far in the jungles ; only those with an abundance of red heart-wood will answer. This is chopped into slices a few inches square. Under two large sheds are the furnaces, shallow and with a slightly convex clay roof, pierced for twenty ordinary sized earthen pots. These are nearly filled with chips, and water is then poured in and boiled until the contents of twenty will only fill two pots. This operation takes place in about an hour and a half. The liquor resembles thin light port, and the *katha* crystallizes on leaves and twigs thrown into it for the purpose. Each pot yields about a seer of an ashy white colour. The work is carried on for twenty hours out of the twenty-four by relays of women and children ; the men merely preparing the wood, which, after being exhausted, is made use of as fuel." The best samples of *kath* are clean and whitish or of a pink colour, but some are dirty and mixed with foreign matter. In 1848, *kath* was worth six rupees a maund in the forests. In the Dún the *kath* is not allowed to crystallize on twigs, but is poured into clay moulds and made into cakes. *Kath* is used as an ingredient in the prepared *pán* so commonly chewed by natives and gives the red colour to the saliva. As a dye it gives brown tints and is largely used for colouring sails and fishing-nets. The average yearly export from the forests between the Ganges and the Sárda is about 120 tons, though but little catechu is now made west of the Rámganga. The bark of this tree is also used in tanning.

Taxus baccata, Linn.—Yew.—*Thaner, geli, gallu, lúst.* The bark yields an inferior red dye only used in the Bhotiya parganahs.

Symplocos cratægoides, Ham.—*Lodh, lod.* The bark and leaves yield a yellow dye and are used in combination with madder. The average annual export from the tract between the Ganges and the Sárda amounts to about twenty tons, of which about nine tons come from the Kumaun forest division.

Alnus nepalensis, Don.—Himálayan alder—*Udis, kunch, koish.* The bark is used in tanning and in dyeing red and is one of the ingredients in the native-made red ink.

(*c.*)—*Extracted from the leaves.*

Justicia Adhatoda, Linn.—*Arúsa.* This plant yields a yellow dye from its leaves by boiling them in water in the proportion of 10℔ to 16℔ until half the water has evaporated. In combination with indigo it gives a dark-blue green. The leaves are procurable at from 20 to 25 seers per rupee.

Cinnamomum Tamala, Nees.—*Dálchíni, kirkiriya, sinkauri,* and leaves *tejpát.* The leaves are more commonly used as a condiment (see *Condiments*), but they are also of use in calico-printing in combination with myrobalans. The average annual export from the tract between the Rámganga and the Sárda is about 33 tons of the leaves and 24 tons of the bark.

(*d.*)—*Extracted from the fruit-rind.*

Acacia arabica, Willd.—*Babúl.* This tree does not flourish in the Kumaun Himálaya, though stunted specimens are found as high as 3-4,000 feet. It occurs, however, in the drier tracts along the foot of the hills and yields a black dye from the pods, which are simply pounded and boiled. The gum is also used extensively by dyers and calico-printers and the bark in tanning.

Mallotus phillipinensis, Müll—*Kamela, rúína, roli.* The ripe fruit of this small tree is covered with a powder that yields an orange dye. It is commonly used in dyeing silk and wool and gives a rich flame colour of great beauty and permanence and is one of the best of its kind. It sells at from 3 to 4 seers per rupee. Stewart writes :—"The ripe capsules are gathered off the bushes in March, and after being allowed to lie in a heap for a few hours are rubbed and kneaded with the feet on the ground to remove the powder, the broken capsules being then separated by winnowing, sifting, and picking. One man will collect about a seer of the powder in a day, which is bought by the dealers at five seers for a rupee. The above process will quite account for the commercial *kamela* not being very clean; but besides this, although the Bhuksas, who gather it, deny that any adulteration takes place, it is said never to reach the plains' market in its comparatively pure state." The substances added are stated to be the pounded bark of *Casearia tomentosa*, Roxb., the *chíla* of Garhwál, and the red powder on the fruit of the *Ficus indica*, Roxb., the common banyan or *bargad*. On the other hand *kamela* itself is used to adulterate arnotto. The bark is employed in tanning. About 2,000 maunds of the powder are exported every year from the Kumaun forest division.

Punica Granatum, Linn.—Pomegranate—*Anár, dárim*, and the rind of the fruit *náspál*. The rind of the pomegranate is used as a tan and dye for leather and gives cloth the greenish colour known as *kakrezi*. It is, however, generally used with some other dye as a concentrator, in which case the pulverised rind is boiled along with the dye. The flowers also yield a fleeting dye of a light-red colour. Morocco leather is tanned and dyed with the bark of this tree, of which the export amounts to the large quantity of 270 tons per annum from the Kumaun forest division alone.

Terminalia Chebula, Retz.—*Har, harara*. The dried fruit are the black or Chebulic myrobalans of commerce used as a dye, tan, and medicine. Galls are also found on the leaves which in conjunction with alum yield a good permanent yellow dye. The average yearly export from the forests between the Jumna and Sárda amounts to about 50 tons, of which the Kumaun forest division yields 550 maunds or about 20 tons.

Terminalia belerica, Roxb.—*Bahera*. The dried fruit of this species also forms one of the myrobalans of commerce used in dyeing cloth and leather and in tanning. Native ink is made from it and it is also used in medicine. The average annual export from the same tract as the preceding is about ten tons.

Phyllanthus Emblica, Linn.—*Aonla, amlika*. The fruit of this species furnishes the Emblic myrobalans of commerce used as a dye, a tan, and in medicine. The bark is also used in tanning. The fruit is pounded and boiled in water, and in combination with sulphate of iron yields the bluish-black colour *abunsi*, and alone is used as a hair-dye and ink-material. The annual export from the Kumaun forest division is about four tons.

Ægle Marmelos, Corr.—*Bel.* The rind of the fruit is occasionally used with myrobalans by calico-printers, and by itself yields a fleeting yellow dye. The annual export from the Himálayan forests is, however, very small.

(*e.*)—*Extracted from flowers.*

Nyctanthes Arbor-tristis, Linn.—*Har, harsinghár, pakúra, ladúri, kiyera.* The flowers yield a fine but fleeting buff or orange-brown dye. It is much used in combination with other dyes, and the flowers can be had in any quantity from the submontane forests at from 2-6 seers per rupee.

Butea frondosa, Roxb.—*Dhák, palás, chichra.* The flowers (*kásu, tesu*) yield a fleeting yellow dye with alum, much used in the Holi festival. The tree occurs abundantly along the foot of the hills, and is very remarkable from the effect produced by its large orange-red flowers.

Cedrela Toona, Roxb.—*Tún, túni.* The flowers of this well-known tree also yield a yellow dye known as *basanti*, from the practice formerly in fashion to wear clothes dyed yellow at the spring festival (*basant*). A red dye is occasionally extracted from the seed.

Tagetes erecta, Linn.—*Genda.* The flowers of this plant, the common marigold, also yield a yellow dye which is, however, but little used except by the poor.

Woodfordia floribunda, Salis.—*Dhái, dhaura, tháwa, dhárla.* The red flowers of this large shrub are used in dyeing silk; the average annual export for this purpose from the tract between the Jumna and the Sárda being about 27 tons, of which about 200 maunds come from the Kumaun forest division. The leaves and twigs also yield a yellow dye.

Parmelia kamtschadalis, Esch.—Rose lichen—*Charíla, chalpúri, charchubílu, chalchalira.* This lichen is used in calico-printing to give a perfume to the cloth and a rose tinge. The average annual export from the tract between the Ganges and the Sárda is about 25 tons.

TANS.

(*a.*)—*Tanning agents derived from the bark.*

Acacia arabica, Linn.—*Babúl.* The bark of this tree is the most plentiful and effective of all those used for tanning purposes. The legumes and leaves also have similar properties in a less degree. Besides tanning a skin, the *babúl* bark dyes it a buff colour.

Cassia Fistula, Linn.—*Amaltás, kitola, itola, kitwáli, simhára, sím.* The bark of this tree yields a tan and dye and, like the preceding, the pods contain much tannin. The average annual export of the bark from the forests between the Rámganga and the Sárda amounts to about sixteen tons.

Shorea robusta, Gærtn.—*Sál.* The bark of this tree, so well known for its timber, contains tannin, though it is not much used as a tanning material.

Butea frondosa, Roxb.—*Dhák, palás.* The bark contains an excellent tanning agent much used where *babúl* is not procurable.

Myrica sapida, Wall.—*Káiphal.* The bark is used in medicine and as a tanning agent. The average annual export from the tract between the Jumna and the Sárda amounts to about seventy tons.

Bauhinia purpurea, Linn.—*Kachnár, khairwál, gúriál.* A common small tree, the bark of which is used in tanning.

Buchanania latifolia, Roxb.—*Kath-bhiláwa, muriya, piyál.* The bark of this tree is also a tanning agent.

Garuga pinnata, Roxb.—*Kharpat.* The bark yields a tanning material.

Zizyphus Jujuba, Lam.—*Ber, khalis, guter.* This tree yields a much valued tanning material in its bark. The export of oak bark of various kinds from the Kumaun forest division alone amounts on an average to between 50 and 60 tons per annum.

(*b.*)—*Tanning agents derived from fruits.*

Terminalia Chebula, Retz.—*Har, harara.* This and the fruit of *T. belerica* form the Chebulic and Beleric myrobalans of commerce, used as an ingredient in tanning mixtures.

Semecarpus Anacardium, Linn.—*Bhiláwa.* The fruit of this tree, better known as the 'Marking-nut tree,' is used in medicine and as an ingredient in varnish. When pounded and boiled in rape oil it is applied to stay putrefaction in hides.

The *babúl*, *dhao*, *bahera*, *har* and *dhauri* or *bákli* (*Anogeissus latifolia*, Roxb.) are also used as tanning agents, and the milky juice of the *ák* or *madár* in curing catgut and cleaning leather.

C.—GUMS AND GUM-RESINS.

There are six classes of gums known to commerce, each of which admits of numerous varieties : (1) gum-arabic ; (2) gum-senegal ; (3) cherry gum and the gum of other stone-fruit trees ; (4) gum-tragacanth ; (5) gum of Bassora, and (6) the gum of certain seeds and roots.[1] The first five spontaneously flow from trees and the sixth is extracted by boiling water. Representatives of (1), (3), (4), and (6) occur in Kumaun, and in addition we have the oleo-resin *bhiláwa* and tar and turpentine. The better classification, however, is that proposed by Cooke, *viz.*:—

I—Gums—
- A.—True gums—
  - (*a*)—Arabic kind as *babúl* (*Acacia arabica*).
  - (*b*)—Cherry kind as *padam* (*Prunus Puddum*).
- B.—Pseudo-gums—
  - (*a*)—Tragacanth kind as *kulu* (*Sterculia urens*).
  - (*b*)—Dark or Moringa as *sahajna* (*Moringa pterygosperma*).
- C.—Astringent gums as dhák (*Butea frondosa*).

II.—Gum-resins—
- A.—Emulsive as *gota-ganba* or *gamboge*.
- B.—Fœtid as *híng* or asafœtida.
- C.—Fragrant—
  - (*a*)—Bdellium kind as *gúgal.*
  - (*b*)—Benzoin kind as *lubán.*

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[1] For a full account of the 'Gums and Gum-resins' in these Provinces, see my "Notes on the Economic Products of the N.-W. Provinces," Part I., Allahabad, 1876.

III.—Resins—

A.—Hard or Copaline—

(*a*)—Pale resins as *safed damar* (*Vateria indica*).

(*b*)—Dark resins as *kála damar*.

B.—Soft or elemi as *jangli-badám* (*Canarium commune*).

IV.—Oleo-resins—

A.—Balsams as *bálsan-ki-tel*.

B.—Varnishes as *bhiláwa*.

C.—Turpentine and tar.

The average annual export of gums, some years ago, from the Garhwál forest division was about 265 maunds, and of *birja* or pine-resin about 30,500 pitchers of 2½lb. each. From the Dehra Dún the export of *semli* gum is about 786 maunds, and of *dhák* gum about 27 maunds, whilst about 200 maunds of gum are exported every year from the Kumaun forest division. Taking gums alone, the average yearly outturn from the Himálayan forests of these provinces is about 1,300 maunds. If encouragement were offered and trained collectors were employed, the quantity of produce of each kind of gum would be much more than at present; but so long as African gums can be sold in the London market at their present low rates, there is little hope that this branch of industry can be extended with profitable results.

I.—GUMS.

A.—TRUE GUMS.

Acacia arabica, Willd.—*Babúl*. This common tree yields the East Indian gum-arabic or gum gattie of commerce used in medicine and the arts. The bazar collections, however, contain the gum of allied species under the same name, *babúl-ki-gond*. The gum exudes spontaneously or is procured by incisions in the bark, when the sap runs out and hardens into small lumps varying in form and size. There are two kinds, the brown and white gum; the former is more esteemed in medicine and the latter in the arts. The gum exudes principally in March-April, and a good tree should yield about 2lb in the year. The bazar specimens occur in broken tears of a brownish red to brown, light-brown and white colour, rather brittle with a shining fracture and wholly soluble in water, forming a dark-coloured mucilage. With this gum is usually collected and sold the gum of the following allied species :—

A. Catechu, Willd.—*Khair.*
A. Farnesiana, Willd —*Wiláyati babúl.*
A. lenticularis, Ham.—*Khain.*
Albizzia procera, Benth.—*Safed-siras, kharanji.*
A. Lebbek, Benth.—*Siras.*
A. odoratissima, Benth.—*Wiláyati siras.*

Ægle Marmelos, Corr.—*Bel.* This tree yields a good gum-arabic, occurring in tears like coarse brown sugar and of a similar colour.

Prunus Puddum, Roxb.—*Padam, púya, paya.* This and the other species of cherry yield a gum-arabic of the stone-fruit kind which, however, is not of commercial importance owing to the smallness of the yield and the presence of other gum-bearing trees.

Buchanania latifolia, Roxb.—*Piyál, muriya, kath-bhiláwa.* This tree occurs commonly in the Bhábar and yields a pellucid gum by incision, known in the plains as *chironji-ki-gond.*

Bauhinia variegata, Linn.—*Kachnár.* This and its allied species yield a gum known as *sem-ki-gond.* It is said to be a brownish mild gum that swells in water and is only partly soluble.

Careya arborea, Roxb.—*Kumbh.* This tree yields a greenish gum regarding which but little is known.

Cassia Fistula, Linn.—*Kitwáli, amaltás.* A red juice exudes from the bark and hardens into a gum called *kumarkas*, regarding which further information is desirable.

Cedrela Toona, Roxb.—*Tún.* This tree yields a resin rather than a gum.

Sponia orientalis, Planch., yields a gum of the cherry tree kind.

Anogeissus latifolia, Wall.—*Dháwd, dhaura, bákli.* It yields a fine white hard gum used chiefly by calico-printers.

Odina Wodier, Roxb.—*Jhingan, jíban, sindan.* The gum is obtained from incisions in the bark and when solidified appears much like glue. It is used for ink-making and in the finer parts of stucco work. There are two sorts exported from Kumaun; the white (*kanne*) picked from the tree and sold at about ten seers for the rupee, and the black (*jingan-ki-gond*) gathered on the ground and sold at fifteen seers for the rupee.

Elæodendron glaucum, Hook.—*Bakra, shauriya, mámri.* The gum produced by this tree is known as the *jamrási* gum in the Central Provinces. It occurs in roundish tears and is soluble in water.

Feronia Elephantum, Corr.—*Kath-bel, kait.* The gum of this tree is recommended as a substitute for gum-arabic in medicinal preparations.

Woodfordia floribunda, Salisb.—*Dhái, dhaura.* The gum of this tree deserves further examination. It appears to be of the tragacanth kind and swells in water. Specimens of the gum from the following trees known to yield gum should be collected and subjected to examination :—

Scientific name.	Vernacular name.	Page in Brandis.	Scientific name.	Vernacular name.	Page in Brandis.
Citrus Aurantium ...	*Narangi*	53	**Semecarpus Anacardium,**	*Bhiláwa*...	124
,, medica ...	*Bijaura* ..	51	**Terminalia Arjuna** ...	*Arjún* ...	224
Phyllanthus Emblica,	*Amlika* ...	454	**,, tomentosa**...	*Sain* ...	225
Erythrina indica ...	*Pangara* ...	139	**,, belerica** ...	*Bahera* ...	222
Garuga pinnata ...	*Kharpat* ...	62	**,, Chebula** ...	*Har* ...	223
Jatropha Curcas ...	*Safed-ind* ...	442	**Zizyphus oxyphylla** ...	*Jigar* ...	85
Melia Azedarach ...	*Bakáyan* ...	68	**,, Œnoplia** ...	*Beri* ...	86
Morus indica ...	*Tút* ...	408	**,, Jujuba** ...	*Ber* ...	86
Punica Granatum ...	*Dárim* ...	241	**,, rugosa** ..	*Dhauri* ...	89
Sapindus detergens ...	*Rítha* ...	107	**Schleichera trijuga** ...	*Kusumbhu,*	105

B.—PSEUDO-GUMS.

(*a.*)—*Pale or tragacanth kind.*

Cochlospermum Gossypium, D. C.—*Kúmbi.* This tree yields the gum *katíra* of the local Materia Medica. It occurs in semi-transparent, white, striated pieces very much twisted and contorted.

Sterculia urens, Roxb.—*Gulu, kuru.* This tree also yields a gum *katíra* that occurs in large light-brown transparent tough masses. Immersed in water like the other pseudo-gums it swells like a jelly, but does not dissolve except by protracted boiling. *S. villosa,* Roxb. (Brándis, 32), the *udála* or *udiyál* of Kumaun, and

S. colorata, Roxb. (Brandis, 34), the *bodula* of Kumaun, yield a similar gum.

(*b.*)—*Dark or Moringa kind.*

Moringa pterygosperma, Gærtn.—*Sahajna.* This tree yields a gum of the sort known as *mocharas*, used in medicine. It occurs in irregular pieces of a whitish to a reddish-brown colour.

Bombax malabaricum, D. C.—*Semal.* The gum of this tree is also known as *mocharas*. It occurs in opaque, light-brown, knotty pieces, inodorous and of a slightly astringent taste, and contains a large proportion of gallic and tannic acids. It is chiefly used as an astringent in medicine.

Stereospermum suaveolens, D C.—*Páral.* This tree yields a gum of the same character as the preceding, but not in general use nor sufficiently examined.

C.—Astringent Gums.

Pterocarpus marsupium, Roxb.—*Bíja-sál.* This tree, rare in Kumaun, yields a gum of the kind known as *kino.* It is procured by incisions when the tree is in flower, and the gum is collected on leaves placed beneath the cuts in the bark. It forms a part of the commercial East Indian gum-kino.

Butea frondosa, Roxb.—*Dhák*, *palás.* The gum of this useful tree is the principal sort exported as gum-kino under the local name *kamarkas.* It occurs in the form of tears which when fresh are of a beautiful red colour, but when kept for any time become opaque and darker in colour. It is used in medicine and for tanning and dyeing.

Ougeinia dalbergioides, Benth.—*Sándan*, *chándan.* This tree yields by incision a sort of gum-kino used medicinally for the same purposes as Butea kino.

II.—GUM-RESINS.

A.—Emulsive gum-resins.

Under this class come the products of trees of the genus *Garcinia*, none of which occur in these provinces.

B.—Fœtid gum-resins.

Under this class we have asafœtida, gum-ammoniacum, and others that do not occur in these provinces.

C.—FRAGRANT GUM-RESINS.

To this class belong the gum-resins which are not emulsive and do not possess the fœtid odour of the preceding, but none of them occur in these provinces.

III.—TRUE RESINS.

A.—COPALINE RESINS.

Shorea robusta, Gærtn.—*Sál.* The resin of the *sál* constitutes one of the common dammars of the bazar and occurs in small rough pieces from a pale creamy colour to a dark-brown nearly opaque and very brittle. Each piece has a striated appearance, as if composed of several layers It is devoid of taste and smell, sparingly soluble in alcohol, almost entirely so in ether and perfectly so in turpentine and the fixed oils. The superior kinds are sufficient substitutes for pine-resins in medicine. Since the conservation of the *sál* forests has been taken in hand the export of this resin has very much declined.

B.—ELEMI OR SOFT-RESINS.

No representative of this group is traceable in Kumaun, though several occur in Southern India.

IV.—OLEO-RESINS.

A.—BALSAMS.

No representative of this group occurs in the North-Western Himálaya, though common in Eastern Bengal and Asám.

B.—NATURAL VARNISHES.

Semecarpus Anacardium, Linn.—*Bhiláwa.* The pericarp of the fruit is full of an acrid juice used in medicine and to form a black varnish. There is a considerable trade in these seeds, of which the exports from the forests between the Jumna and the Sárda every year amount to about 125 maunds. Varnishes are also said to be procured from the *Odina Wodier* noticed before for its gum, *Buchanania latifolia*, *Rhus succedanea*, and *R. vernicifera*, all of which occur in the Himálayan districts of these provinces.

C—TURPENTINE AND TAR.

Pinus longifolia, Roxb.—*Chír, salla, kolon, saral, thansa.*

The long-leaved pine is the principal source of the oleo-resin known as *birja* in Garhwál and *lísha* or *lassa* in Káli-Kumaun, and of the oil called *birja-ki-tel* or *tárpín-ki-tel*. There are two kinds of resin : (1) the *birja* or *berja* sort, which comprises the tears exuding naturally from the bark ; and (2) the *bakhar-birja*, or resin produced by making long and deep incisions in the sap-wood. The latter is chiefly used by bangle-makers. The resin is highly charged with oil of turpentine, and of late years some attempts at extracting it have been made. The oil of turpentine sells at from twelve to fourteen annas per bottle, and the residue known as *sundras*, the black colophony of commerce, is sold on the spot at about four rupees per maund. I am not aware of any attempt having been made to value this product, but of a similar article from British Burma Dr. Forbes Watson writes (1873) :—

Turpentine.

" The crude turpentine from British Burma has been very favourably reported upon. It is the produce of *Pinus Khasyana* and *Pinus Massoniana*, the market rate being about 4*d*. per ℔. in Burma. The reports of the two firms to which the sample was submitted for valuation are :—' No. 5—We have submitted the crude turpentine to the trade, and have their report to the effect that it appears to be of very fair quality. We estimate the market value would be from £12 to £14 per ton. No. 6—We have carefully examined the sample of rough or crude turpentine and found the quality to be fine and equal to any ever imported from the United States, where the distillation for this market and that of the continent (Bordeaux excepted) is carried on. Crude has ceased to be an article of import ; there was not any since 1868, where twenty years ago it was a great trade. The nominal value of the sample before us would be 13*s*. 6*d*. per cwt. Manifestly, if the value in Burma of this turpentine is about 4*d*. per ℔., or 37*s*. per cwt., and its value here is only from 12*s*. to 14*s*. per cwt., it would be far better to rely upon home consumption.' "

The average annual export of resin from the Garhwál forests during the five years 1869-73 amounted to about 35 tons. During the same period the average annual export of the *birja* sort from the Kumaun forests was 86 maunds, of the *bakhar-birja* description 45 maunds, and of the oil about 10 maunds. This industry is now discouraged as much as possible owing to the destruction of much valuable timber. The chips of the *chír*, *deodár*, and *P. excelsa*, yield tar by dry distillation. The following account of the process is given by Mr. Baden Powell :—" First an earthen *ghara* or vessel with a wide mouth, and capable of containing about four sers, is sunk in the ground. Next a large *ghara* of about twelve sers capacity is taken, and three small holes are drilled in its underside : it is then filled with scraps of the pine wood, and over its mouth another small jar is placed and kept there by a luting of clay very carefully applied, and then both the jars are smeared over with a coating of clay. These two jars thus stuck together are next set on the mouth of the receiver or *ghara* sunk into the ground, and the joint or seat is made tight by a luting of stiff clay. Light firewood is now heaped around the apparatus and ignited, and kept burning from four to eight hours ; the rationale of the process being that the heat causes the tar contained in the chips inclosed in the large *ghara* to exude, and it falls through the three holes drilled in the bottom, and into the receiver sunk into the ground. When the fire is out, the ashes are raked away, the jars very carefully separated, so that pieces of dirt may not fall into the receiver, and the latter is then exhumed and the contents poured out. It is only necessary to replace the receiver with the jars over it as before, duly charged with chips, and lute the joints up carefully, and the process can be carried on as before. With care the same jars may be made to do over and over again without cracking. One ser of wood yields about 2·6 chhatáks of tar and 4·3 chhatáks of charcoal. To procure a ser of tar requires 6 sers 4 chhatáks of wood chips to charge the pot, and 2 maunds 6 sers and 9 chhatáks of chips for fuel. The estimated cost is one anna per ser, but this is far too low."

Tar.

Besides the long-leaved pine the following conifers[1] occur in the Himálayan districts of these provinces, and some yield resin, tar, and turpentine.

Pinus excelsa, Wallich. Brandis, 510. The tar produced from this tree is said to be equal to the best Swedish. It is a mixture of resin and oil of turpentine more or less blackened by the admixture of empyreumatic products. It thickens after exposure to the atmosphere and is used for protecting wood-work in every position.

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[1] For the intricate vernacular synonym see *postea*.

Pinus Gerardiana, Wallich. Brandis, 508. This tree is very resinous and is much used for torches. Major Longden obtained excellent tar from the chips. Gordon states that it affords abundance of fine turpentine and the cones exude copiously a fine white resin. Brandis says it is very resinous and that a good white resin may be obtained in quantity from the bark and cones.

Cedrus Deodara, Loudon. Brandis, 516. The *deodár* yields an oleo-resin like that of the *chír* and an oil which is used in medicine. Tar is also procured from the chips of the sap-wood.

Abies Smithiana, Forbes. Brandis, 525. Both Stewart and Royle mention it as a resin-bearing conifer. It does not appear to be common east of the Alaknanda.

Nothing is recorded regarding the resinous properties of *A. Webbiana* and *dumosa* and of *C. torulosa*. *Juniperus communis*, *recura* and *excelsa* aud *Taxus baccata* are the great sources of *dhúp* or incense in India and Tibet.

Elastic gum-resin.

Calotropis gigantea, R. Br.—*Madár*, *ák*. This and the allied species, *C. Hamiltonii*, Wight., yield an elastic gum-resin which is procured by making incisions in the plant and is used as a substitute for gutta-percha. Dr. Riddell calculated that ten average-sized plants will yield as much juice as will make one pound of this substance. The juice when collected is evaporated in a shallow dish, either in the sun or in the shade, and, when dry, the substance is worked up in hot water with a wooden kneader in order to get rid of the acridity of the gum. The juice is also used to destroy the offensive smell of fresh leather and in medicine. The *madár* also yields a kind of manna known as '*shukr-ul-ushr*,' which is caused by an exudation from the piercing of an insect called *galtigál*.

LAC.

Lac is found all over these provinces, notably in the Bundelkhand, Bhábar, and Gorakhpur forests. It consists of a resinous substance produced from the female of the *Coccus Lacca*, an insect which is found on the twigs and branches of the pípal (*Ficus religiosa*), bargad (*Ficus indica*), kathbel (*Feronia Elephantum*), ber (*Zizyphus Jujuba*), dhák (*Butea frondosa*), the *Erythrina indica*, *Schleichera trijuga*, *Inga dulcis*, and others The Hindús have six names for lac, but they generally call it *laksha* (*lakh*, 'one hundred thousand)' from the multitude of small insects which, as they believe, discharge it from their stomachs and at length destroy the tree on which they form their colonies.[1] There are two products from this resin, the lac dye and the various forms of the resinous lac. A description of the insect will be found hereafter in its proper place.[2]

Manufacture.

The process of manufacture may be briefly described as follows :—The stick-lac as it is brought in is picked and triturated in water, which takes out the colouring matter that forms the dye, and the residue deprived of all impurities forms the seed-lac. This is then sewed up in a long narrow bag about the size of a cable and passed over a charcoal furnace; when the resin melts and when quite fluid it is passed on to a man seated before another charcoal fire with a cylinder of glazed earthenware in front about two feet long and eight inches in diameter supported on pivots at each end : or in some places the stem of the plantain is used. The melted wax is allowed to drop on the cylinder and forms thin layers about eighteen inches square known as shell-lac. These are sorted according to consistence and colour ; orange, liver, garnet and their varieties being the order of excellence. Sometimes the seed-lac is merely melted into buttons or lumps, but this is usually only done with lac of inferior quality and for home consumption.

The analyses of Unverdorben and Hatchett give the constituents of stick-lac as—(1) an odorous resin soluble in alcohol and ether ; (2) a resin insoluble in ether ; (3) a bitter balsamic resin ; (4) laccic acid; (5) a dull yellow extract ; (6) colouring matter ; (7) a fatty matter ; (8) some salts and earth. The resin according to Unverdorben contains—(1) a resin soluble in ether and alcohol ; (2) a resin insoluble in ether and soluble in alcohol; (3) a resinous body little soluble in alcohol; (4) a crystallizable resin; (5) an uncrystallizable resin. Hatchett's analysis of 100 parts gives resin, 68; colouring matter, 10; wax, 6; gluten, 5·5; foreign substances, 6 5; loss, 4. His analysis of shell-lac gives resin, 90·5; colouring matter, 0·5; wax, 4·0; gluten, 2·8; loss, 1·8.

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[1] Sir W Jones quoted by Birdwood, 274, 322. Other insects of this genus furnish a colouring matter. The female of *C. ilicis* is the Kermes; that of *C. Cacti*, the nopal or cochineal and the female of C. *polonicus* produces the scarlet grains of Poland.

[2] Chiefly from Carter's notice in Ann. Mag. Nat. Hist., VII., 31, 41.

The lac insect can be removed from one forest to another by merely taking the insect on the stick while in its transition state and applying it to the branches of a similar tree. There are two seasons of the insect's activity in Upper India, the one commencing in June and the other in November. The first crop is ready in September and the second in February or March, but neither are gathered until the season for the next operation has commenced. Thus the March crop may be gathered in June and the September crop in November. Should, however, the object be more to obtain lac dye than resin, the sticks should be gathered before the insect escapes to commence its next season's operations. The best Indian lac of these provinces is manufactured at Mirzapur, where the materials are collected from all parts of the North-west, but principally from the jungles of Central India as far south as Sambhalpur. Lac makes an excellent varnish and is used in combination with various colouring matters to make the durable lacquer so well known in Benares toys. It is also used for sealing-wax and for housepainters' varnish.

D.—FIBRES.[1]

The forests and wastes of the lower hills and the submontane tract yield an immense quantity of materials for ropes, cordage, twine, basket-making and matting, but little of which has as yet received the attention due to it. The *bábar* grass alone is sufficient in quantity to supply all India with a valuable material for making coarse cordage and paper. The bambu of the Garhwál Dúns might be utilised in the same way, and the reeds and grasses of the Bhábar and Tarái afford an inexhaustible supply of common twine and matting material· The hemp of Garhwál has more than a local reputation and for a long time furnished a portion of "the annual investment" of the East India Company. The pulp manufactured from the *Daphne papyracea* yields materials for a paper that gives the engraver finer impressions than any English-made paper and nearly as good as the fine Chinese paper that is employed for what are called India paper-proofs. The paper made from this shrub in Kumaun is almost as strong and durable as leather and is largely used for village records and court proceedings. It is exported to Tibet on the north and to the plains on the south for manuscripts and account-books. With this wealth of raw material in existence it is remarkable that so little has been done to render the fibre resources of our hills available to European enterprise, and it is the object of the following pages again briefly to bring them to notice.

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[1] A botanical description of all the fibre-producing plants mentioned in the following list will be found in Part VI. of my "Notes on the Economic Products of the North-Western Provinces." The reference at the foot of each notice here is also to a botanical description of the plant.

Abutilon indicum, Don. A mallow found in the lower hills and Bhábar, the stem of which yields a cordage fibre. Hooker, Fl. Ind., I., 326. *A. polyandrum*, Schlecht, found up to 3,000 feet, also yields a fibre. Hooker, *l. c.*, 325.

Hibiscus ficulneus, Linn., affords a very large proportion of strong fibre of a white colour useful for twine and light cordage. Hooker, *l. c.*, 340. *H. pungens*, Roxb., and *H. cancellatus*, Roxb. (Hooker, *l. c.*, 341, 342), also yield a soft, silky fibre useful for cordage, and are hence generically known in Kumaun under the name *kapasiya*.

Hibiscus cannabinus, Linn., *san*, grows wild and is also cultivated to a small extent in the Kota Dún and Bhábar. Hooker, *l. c.*, 339.

Kydia calycina, Roxb.; *patta, pattiya;* common in dry forests and along the submontane tract. Yields a strong coarse fibre from the inner part of the bark. Hooker, *l. c.*, 348.

Bombax malabaricum, D.C., cotton-tree ; *semal.* The cotton from the pods is chiefly valuable as a half-stuff for paper. Experiment has shown that the staple is too short for use as a textile fabric (J. Agri-Hort. Ben., III., 122), and it is now chiefly employed for stuffing pillows and the like, and for this purpose there is a small export trade. Hooker, *l. c.*, 349.

Sterculia villosa, Roxb., is the *uddála* and *udiyál* of the Kumaun Bhábar. This tree grows to a considerable size, but it is only the saplings from two to three years old that are useful for fibre. From these the layers of bark can be stripped off from one end to the other, the inner furnishing a fine and the outer a coarse cordage fibre that stands moisture well. One stem will yield about 2℔. of good fibre by steeping the bark well and beating it out with wooden mallets. The ropes made from it are strong enough for elephant harness, but are chiefly used for cattle halters. The rope is said to become stronger for a time from being frequently wetted, but it seldom lasts more than eighteen months if constantly exposed to moisture. The root of the tree is eaten in the hills. Hooker, *l. c.*, 355.

Sterculia colorata, Roxb, the *bodála* and *bodál* of Kumaun, occurs somewhat commonly at the foot of and along the lower range of hills. The bark yields a fibre for cordage similar to that of the preceding species. Brandis, 34.

Abroma augusta, Linn.: cultivated in gardens in the Dehra Dún where it is probably introduced. It yields a very strong fibre fit for cordage. Hooker, *l. c.*, 375.

Grewia asiatica, Linn.—*Pharsiya*, *phalsa*, *dhámin*. Occurs wild in the lower hills, cultivated in the plains. The inner bark yields a fibre like the basts of Europe. Hooker, *l. c.*, 386.

Grewia oppositifolia, Roxb., the *bhenwal* and *bhimal* of Garhwál and *bhengúl* of Kumaun, occurs commonly in the lower hills 2,500-4,500 feet and up to 6,000 feet. It is occasionally cultivated. Hooker, *l. c.*, 384. It yields an inferior fibre similar to the preceding and for which the branches are cut from July until March or, indeed, at all seasons except in the spring. The leaves are given to cattle, and the sticks are soaked for a month or forty days in water and when dry are beaten on stones and the bark is stripped off. One tree will give about five sers of the inner fibre fit for making into ropes and twine, which are used for tying up cattle and for stringing cots. It is neither very strong nor very durable. Women use the green bark for cleaning their hair. (Hud.)

Odina Wodier, Roxb.—*jinghan*, *Jíban*, *sindan*; occurs in the dry forests along the foot of the hills, ascending the outer range up to

4,000 feet. The bark yields a coarse cordage fibre. Hooker, II., 29.

Butea frondosa, Roxb.—*Dhák, palás;* is common in the Dúns and warm valleys and yields a very strong fibre from its bark used for caulking boats and making rope. Hooker, II., 164.

Desmodium tiliæfolium, Don.—*Chamara, matta;* occurs along the outer range 3-8,000 feet and yields from its bark a substance from which paper is made. In Kunaor there is some trade in this paper with Tibet. Hooker, II., 168: Panj. Prod., 516.

Bauhinia racemosa, Lam.—*Kachnál, gúrál;* occurs in the dry parts of the plains and ascends the hills in Kumaun to 5,000 feet. The inner bark yields a strong cordage fibre. Hooker, II., 276.

Bauhinia Vahlii, W. *et* A.—*Máljan, málu* ; is a large creeper that occurs rather commonly in the lower hills and upper Bhábar from the Jumna to the Sárda, especially at the bottom of hot valleys and along the sides of precipices. The leaves are used for making umbrellas, and sewn together with twigs form baskets for holding pepper, turmeric, and ginger. They are also used as a substitute for plates at meals and by the petty shop-keepers to wrap up the goods that they sell. This creeper often attains a length of 40-50 feet, and is generally cut down in July-August, though it may be cut at all seasons. In its natural state it is used for making rope-bridges, but to manufacture rope from it, the outer bark is peeled off and thrown away and the inner coating is steeped in water and twisted when wet. A large creeper will produce a maund of this fibre known as *selu*. Before being used, the bark is boiled and beaten with wooden mallets, which renders it soft and pliable enough for being made into rope and twine used in the erection of rope-bridges, for thatching, stringing cots, and the like. These ropes though strong are not very durable and require occasional soaking, though if constantly kept in the water they rot quickly and altogether do not last more than eighteen months. The broad flat seed of the pod is eaten fried in clarified butter. Hooker, II., 279.

Gerbera lanuginosa is the well-known tinder-plant or *kapasiya* of Kumaun. The tinder is derived from the tomentum on the lower side of the leaves, which is also woven into twine and then netted into small bags for carrying hukkas, &c., so much in use amongst the hill-men.

Careya arborea, Roxb.—*Kúmbhi;* is a large tree that occurs in the forests along the foot of the Himálaya from the Jumna to the Sárda. The bark affords a fair fibre fit for cordage and twine. Hooker, II., 511.

Calotropis gigantea, R. Br.—*Safed-ák, madár;* is a large plant or shrub; common along the foot of the hills. This is the species that prevails in the Bháɒar, where large patches of it occur, especially near Kálidhúngi, but it does not occur westwards of the Ganges at Hardwár. It yields a soft, silky fibre fit for cloth manufacture and for making the finer kinds of twine: see Sel. Rec. Bom., XVII.; Journ. Agri-Hort. Ben., VIII., 73, 226, 231.

Calotropis procera, R. Br.—*Ak, madár;* is the prevailing species from Hardwár southwards and westwards. This species also yields a valuable fibre. Brandis, 331.

Marsdenia tenacissima, W. *et* A., occurs in the plains and ascends the hills up to 4,000 feet. The bark of the young shoots yield a fine fibre remarkable for its strength and toughness, formerly used by natives for bow-strings. Roxburgh, 258.

Marsdenia Roylei, Wight—*Murkúla;* a large knotty creeper that occurs along the outer ranges of the Himálaya up to 6,000 feet. It is cut at the knots and boiled in a mixture of ashes, after which the outside bark is thrown away, and the inner yields a fibre used for making fishing-nets and lines of great strength and durability and is capable of forming a cloth material. Brandis, 333.

Orthanthera viminea, Wight; the *chapkiya* of Kumaun; occurs along the foot of the Himálaya, ascending the lower valleys in Káli Kumaun for some distance. The bark is steeped in water and then yields a fibre that affords a good cordage material and is remarkable for its tenacity and length. Drury, F. P., II., 236.

Cordia Myxa, Linn.—*Bairala, baurala;* occurs wild in the forests below the Himálaya and is also cultivated in many parts of Upper India. The bark yields a fibre used for caulking boats and making rough cordage. Brandis, 336.

Daphne papyracea, Wall., the *set-baríwa* of Kumaun, *satpúra* of Garhwál, and *bhalu-suang* and *bholuwa* of Nepál. Two varieties of this species are commonly found in Kumaun :—the one with white flowers and yellow fruit occurs at 4,000-8,000 feet, and the other with purple flowers and fruit at 7-8,000 feet. Both yield a valuable paper-stuff from which the strong, tenacious hill-paper is made. The following account of the mode of manufacture is from a paper by Mr. B. H. Hodgson in J. A. S. Ben., I., 8 :—

Mode of making the hill-paper usually called Nepálese.

" For the manufacture of the Nepálese paper the following implements are necessary, but a very rude construction of them suffices for the end in view :—

1st.—A stone mortar, of shallow and wide cavity, or a large block of stone, slightly but smoothly excavated.

2nd.—A mallet or pestle of hard wood, such as oak, and in size proportioned to the mortar and to the quantity of boiled rind of the paper plant which it is desired to pound into pulp.

3rd.—A basket of close wicker work, to put the ashes in, and through which water will pass only drop by drop.

4th.—An earthen vessel or receiver, to receive the juice of the ashes after they have been watered.

5th.—A metallic open-mouthed pot, to boil the rind of the plant in. It may be of iron, or copper, or brass, indifferently ; an earthen one would hardly bear the requisite degree of fire.

6th.—A sieve, the reticulation of the bottom of which is wide and open, so as to let the pulp pass through it, save only the lumpy parts of it.

7th.—A frame, with stout wooden sides, so that it will float well in water, and with a bottom of cloth, only so porous that the meshes of it will stay all the pulp, even when dilated and diffused in water, but will let the water pass off when the frame is raised out of the cistern ; the operator must also have the command of a cistern of clear water, plenty of fire-wood, ashes of oak (though I fancy other ashes might answer as well), a fire-place, however rude, and lastly, *quantum sufficit* of slips of the inner bark of the paper tree, such as is peeled off the plant by the paper-makers, who commonly use the peelings when *fresh* from the plant ; but that is not indispensable. With these 'appliances and means to boot,' suppose you take four seers of ashes of oak, put them into the basket above-mentioned, place the earthen receiver or vessel beneath the basket, and then gradually pour five seers of clear water upon the ashes, and let the water drip slowly through the ashes and fall into the receiver. This juice of ashes must be strong, of a dark bark-like red colour, and in quantity about 2℔. ; and if the first filtering yield not such a produce, pass the juice through the ashes a second time. Next, pour this extract of ashes into the metal pot already described, and boil the extract ; and so soon as it begins to boil, throw into it as many slips or peelings of the inner bark of the paper plant as you can easily grasp, each slip being about a cubit long and an inch wide ; (in fact the quantity of the slips of bark should be to the quantity of juice of ashes, such that the former shall float freely in the latter, and that the juice shall not be absorbed and evaporated with less than half an hour's boiling). Boil the slips for about half an hour, at the expiration of which time the juice will be nearly absorbed and the slips quite soft. Then take the softened slips and put them into the stone mortar, and beat them with the oaken mallet till they are reduced to a homogeneous or uniform pulp, like so much dough. Take this pulp, put it into any wide-mouthed vessel, add a little pure water to it, and churn it with a wooden instrument like a chocolate mill for ten minutes, or until it loses all stringiness, and will spread itself out when shaken about under water. Next, take as much of this prepared pulp as will cover your paper frame (with a thicker or thinner coat according to the strength of the paper you need), toss it into such a sieve as I have described, and lay the sieve upon the paper frame, and let both sieve and frame float in the cistern : agitate them, and the pulp will spread itself over the sieve ; the grosser and knotty parts of the pulp will remain in the sieve, but all the rest of it will ooze through into the frame. Then put away the sieve, and taking the frame in your left hand, as it floats on the water, shake the water and pulp smartly with your right hand, and the pulp will readily diffuse itself in a uniform manner over the bottom of the frame. When it is thus properly diffused, raise the frame out of the water, easing off the water in such a manner that the uniformity of the pulp spread shall continue after the frame is clear of the water, *and the paper is made.* To dry it, the frame is set endwise, near a large fire ; and so soon as it is dry, the sheet is peeled off the bottom of the frame and folded up. When (which is seldom the case) it is deemed needful to smooth and polish the surface of the paper, the dry sheets are laid on wooden boards and rubbed, with the convex entire side of the conchshell ; or, in case of the sheets of paper being large, with the flat surface of a large rubber of hard smooth-grained wood ; no sort of size is ever needed or applied, to prevent the ink from running." See also As. Res., XIII., 385.

In Nepál this paper is manufactured exclusively by the tribes inhabiting cis-Himálayan Bhot, known as Múrmis, Lepchas, &c., or generically as Rongbo, in contradistinction to the Sokpo, the name given to the inhabitants of trans-Himálayan Bhot. The manufactories are mere sheds, established in the midst of the great forests of the upper ranges which afford an inexhaustible supply of the material as well as of wood ashes and good water, both of which are essential to the manufacture of the raw material into the blocks from which the paper is made. Specimens of these blocks sent to England have been pronounced by experts to be of unrivalled excellence as a material for the manufacture of that sort of paper upon which proof-engravings are taken off.

Wikstrœmia virgata, Meisner ; the *chamliya* of Kumaun ; is also common in the lower ranges from 5,000-7,000 feet. The paper made from its bark is considered inferior to that made from the bark of the preceding, as it allows the ink to run unless sized, but the bark also affords a strong cordage material, and ropes made from it are used in Naini Tál. Brandis, 386 : Drury, F. P., III., 86.

Bœhmeria nivea, H. *et* A. ; China-grass, Rheea ; grown experimentally in the Dehra Dún and at Sahâranpur. Yields the well-known rheea fibre which is specially noticed hereafter. Brandis, 402.

Bœhmeria macrophylla, Don.—*Gargela;* occurs common in the lower hills up to 4,000 feet. *B. platyphylla,* Don., is also very common and is known as *gargela ;* both yield a fine fibre fit for twine. Dr. Jameson notes that *B. lobata,* under the native name *ullah,* is found in Kumaun and also yields a fibre. Brandis, 403.

Girardinia heterophylla, Decaisne, the *awa-bichhu* of Kumaun and *bábar* of Simla, is a very common weed in the forests along the foot of the Himálaya and yields a fine, strong fibre much used for cordage and twine, but cannot stand much moisture. Brandis, 404.

Villebrunea frutescens, Blume, the *phúsar-patta*, *poi-dhaula* and *kúgshi* of Kumaun, is commonly met with along the foot of the hills ascending to 5,000 feet. It occurs in the neighbourhood of Naini Tál and Bhím Tál and along the valley of the Sarju and Ganges. It has the appearance of a small bambu and grows 6-8 feet, varying in the thickness of the stem from the size of a quill to that of the thumb. It is cut down for use when the seed is formed. The bark or skin is then removed and dried in the sun for a few days; when quite dry it is boiled with wood-ashes for four or five hours and allowed to cool. When cold it is macerated with a mallet on a flat stone while cold water is applied and gradually the woody matter disappears, leaving a fine fibre which is admirably adapted for fishing lines and nets as well for its great strength as for its power of resisting moisture. Brandis, 406.

Maoutia Puya, Wedd.; the *púya* of Kumaun and Nepál, though sometimes known under the same vernacular names as *V. frutescens*, is common in the lower hills and Bhábar, ascending to 5,000 feet.

Debregeasia bicolor, Wedd.; the *tushiyára* of Kumaun; is very common all over the lower hills ascending as high as 7,000 feet and is particularly abundant in the Siwáliks. It yields a very strong cordage fibre. Brandis, 405.

Memorialis pentandra, Wedd.; the *jaiphal-jari* of Garhwál; is also somewhat common in the lower hills and yields a useful cordage fibre. Drury, F. P., III., 210. Swetenham notices a large nettle as occurring in Garhwál, from the bark of which a fibre is obtained after only three days' steeping by merely peeling off the rind from one end to the other. He considered it to be in every way far superior to the fibre of hemp. Huddleston mentions the *jarkand-álu*, *kand-álu* or *kalra* as yielding a fibre from which sandals and ropes are made in the north of Kumaun. It grows 8-9 feet and the stalks are about as thick as a man's finger. They are gathered in the cold season and, after being steeped in water for a few days, yield a fibre by peeling from the thick end in the manner of hemp. Both these notices probably refer to *G. heterophylla*, Decaisne.

Artocarpus integrifolia, Linn., (Jack-tree) and *A. Lakoocha*, Roxb., both yield a cordage fibre from their bark. The former is but rarely seen in the Kumaun division, and the bark of the latter is seldom used for this purpose.

Hemp.

Cannabis sativa, Linn.; *C. indica*, Rumph.; *gúr-bhanga* (female plant), *phúl-bhanga* (male plant). An annual 3-14 feet high according to soil and climate. Root white, fusiform, furnished with fibres. Stem erect, branched, green, angular, covered all over with an extremely fine but rough pubescence. The stem is hollow within or only filled with a soft pith, which is itself surrounded by a tender, brittle substance consisting chiefly of cellular texture with some woody fibres, which is called the 'reed,' 'boons,' and 'shove' of the hemp. Outside this we have the thin bark composed of fibres extending in a parallel direction all along the stalk. These fibres consist of delicate fibrils, united together by cellular tissue and all covered by a thin membrane or cuticle. Found abundantly in the Himálayan districts of the North-Western Provinces. The wild hemp known as *ganára-bhanga*, *ban-bhanga* or *jangli-bhanga*, is of little use for fibre.

The female plant yields seed for oil and the drugs *gánja* (see page 755), *charas*, &c. The male plant yields only fibre from which the *bhangela* cloth of Garhwál is manufactured; also called *kothla*, *bora*, and *gáji*, and the ropes (*sel*) for bridges. For the history of the plant see Royle (Fib. Pl., 315) and Drury (U. P., 106). The possibility of attaining success in the cultivation of hemp in these provinces was pointed out by Dr. Roxburgh as early as 1800, and on the cession of these provinces, skilled Europeans were sent to carry on experiments in the Murádabad and Gorakhpur districts. In Garhwál and Kumaun its cultivation was encouraged, and for many years the East India Company procured a portion of its 'annual investment from the Kumaun hills in the shape of hemp.' With the abolition of the Company's trade the cultivation languished and is now entirely dependent on the local demand, which, however, is by no means small.[1]

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[1] See 'Papers regarding the cultivation of hemp in India,' Agra, 1855: Royle's Fibrous Plants of India, London, 1855, and Drury's Useful Plants of India, Madras, 1858.

Cultivation.

The following account of the cultivation is derived from Huddleston and Batten's notes. There are two varieties common in Garhwál, the wild and the cultivated. The former is practically useless either for fibre or the drug, so we shall confine our notice chiefly to the latter. The cultivated variety in Garhwál is grown chiefly on high lands having a northern exposure in well-prepared and abundantly manured soil close to the village site. Occasionally freshly cleared forest land gives a crop for one year without any need for artificial manure. Irrigation is never resorted to, nor is it needed if the soil be properly prepared. The plant does not flourish below 3,000 feet, as the heat of the valleys is prejudicial to its growth, and it seems to thrive best at elevations of 4-7,000 feet. The mountainous region occupied in Garhwál by the Badhán, Lohba, Chaundkot, Chandpur, Dhanpur and Dewalgarh parganahs, has the greatest area under hemp cultivation. These parganas are marked by lofty ranges, extensive forests and a fairly even temperature. The northern parganahs bordering on the snowy range have no hemp cultivation whatsoever, and there is very little in the parganas bordering on the plains, so that it may be said that the hemp-producing area in Garhwál lies between the Pindar on the north and the southern Nayár on the south and is bounded on the east by the western Rámganga and on the west by the Ganges. The cultivation of the plant as practised in this tract is as follows. The ground, after being well cleared and prepared for the seed, is sown, in the end of May or early in June, at the rate of 26 to 33 sers per *bísi*.[1] During the early growth of the plant the ground is kept free from weeds and the young plants are thinned, leaving a few inches between each, and until the crop has attained a good height, the ground is kept free from all rank vegetation, after which it attains a height of 12-14 feet and is cut in September-November. There are two classes of the cultivated plant, the female and the male. The latter is cut some 4-6 weeks earlier than the former and yields a much stronger and superior fibre. On the stalks being cut green, they are dried for several days in the sun by being piled against the walls of the terraced fields until they become quite brown. The *charas* is extracted by rubbing the hands over the tops of the plant when the seed is ripe and is best in the female plant. The exudation collected is scraped off the hands and made into rolls for sale. The leaves are also pounded for *gánja* and *sabzi*. When the stalks are sufficiently dry they are tied up into bundles and steeped for 15-16 days in tanks or running streams, being kept under water by stones laid upon them. When taken out, they are beaten with wooden mallets and then dried in the sun. The fibre is then peeled off from the thick end of the stalk to the top, and after being again beaten and freed from impurities is tied up into hanks for sale and manufacture of sack-cloth for wear and for bags. For wear, the people simply fold the cloth around the shoulders and fasten it in front with an iron skewer, in the manner the inhabitants of the upper parganahs wear their blankets. Hemp-cloth is still the chief clothing fabric of the poorer classes in Garhwál during the summer months.

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[1] The *bísi* is 40 square yards less than an acre, and the seed used for it is 20-25 *pathas*, or 52-65 lb. avoirdupois.

In Kumaun, hemp is cultivated chiefly in Chaugarkha, especially in pattis Lakhanpur, Dárún, Rangor, and Sálam. There is also a considerable quantity grown in patti Baraun of the Gangoli parganahs, and in a few villages in pattis Assi-Chálisi, Uchyúr, Mahryúri, Gumdes, Dhyánirau, and Malla Chaukot. As in Garhwál there is much prejudice against growing the plant, and it is left almost entirely to the Doms, the Rajpúts considering it degrading to them to be styled "hemp-growers." So much is this the case that the phrase '*tera ghar bhang bono holo*'—'may hemp be sown in thy house'—is one of the most common abusive imprecations. Still there are some differences in the obloquy attached to hemp cultivation, for whilst the Khasiyas may, without loss of caste, grow hemp and manufacture rope therefrom for house consumption, they must abandon the manufacture of hempen sack-cloth to the Doms, of whom the Koli, Bora and Agari sections possess almost an exclusive monopoly of hemp-weaving. All tribes, however, can traffic in the seed and rope, and even in the *charas*, without prejudice to their social position.

In Kumaun the sowing takes place from the middle of May to the end of June. In warm situations the hemp is sown rather later, in order that the heat and damp of the rains may cease before the plant shall have time to run into useless stalk and excessive seed. During July-August the ground about the plants is hoed and fresh earth is heaped up about the roots. The female plant ripens from about the middle of October to the middle of November, and the male plant, that yields the more valuable fibre, somewhat earlier. In Kumaun, the situation of hemp-growing villages is rarely so high as in Garhwál, and a cold climate, though preferred to that found at elevations below 5,000 feet, is not considered absolutely necessary. The favourite situation for the cultivation of hemp in Kumaun is a cool, dry, upland ground with a good soil and with facilities for manuring. Sites near the homestead or close to cattle-sheds in the pasturing grounds of the upper ranges are consequently chosen for the abundance of manure. Hemp is supposed to exhaust the soil, and the wheat and barley, which are commonly sown in succession thereto, are said to be defective both in quality and quantity.

When Dr. Rutherford held his contract for the supply of hemp for the East India Company's investment, he seems to have managed his enterprise by making advances to the headmen of villages or the principal cultivators; and should the cultivation of hemp ever again become a commercial speculation, this would seem to be the best method for obtaining success. The produce of a *bísi* has been estimated at about three seers (6fb.) of *churas*, four maunds (320fb.) of hemp fibre, and 30-35 seers (60-70fb.) of seed, yielding about five seers (10fb.) of oil. In 1814, the fibre was produced for four rupees per maund delivered at the cultivator's doors or five rupees delivered at Kotdwára or Chilkiya, and it would appear that now a price of from six to seven rupees per maund of 82lb. would ensure a constant supply. In 1840, the entire value of the hemp produce in Kumaun, including seed, fibre, and drug, was little more than Rs. 1,000, and Captain Huddleston estimated the total area under hemp in Garhwál during the same year as only 250 acres, yielding about forty tons of fibre per annum; but there is every reason to believe that the outturn has since considerably increased in quantity, and a rough estimate would point to 780 acres under hemp in Garhwál alone in 1880. The seed is collected to be used as a vegetable food, for which purpose, indeed, it is chiefly cultivated in the Sor and Sira parganahs, or to be pressed for the extraction of hemp-oil or to be dried and retained for seed. The *charas* or juicy essence is collected for exportation, being hardly, if at all, used in the hills. It now sells at from four to five rupees per seer, and is resold by the farmer of the drug monopoly at eight rupees per seer. The farm of *charas* in Kumaun alone during 1880-81 was sold for Rs. 3,357. The leaves, too, are dried and exported for use in the various preparations of bhang. The fibres, as already noticed, are made into ropes or sack-cloth. In Kumaun the sale of the untwisted fibres is more common than that of the twisted or manufactured stuff. In 1840, the seed sold at about three rupees per maund, and is now worth about three to four rupees per maund, and in some places where it is chiefly used for culinary purposes is even cheaper. The fibre where it was produced sold at from two to three rupees per maund in 1840 and is now worth from three and a half to four rupees a maund. The *bhangela* or hemp-cloth is made up into sheets for weaving or into *kotlas* or sacks, and the finer sorts into *thailis* or bags for carrying flour and lime. A large sack-cloth bag cost but six annas at Almora in 1840 and is now worth twelve annas. Bags of a smaller size cost about two rupees per dozen in 1840 and are now proportionately more expensive. The produce is so small and the demand for bags for sending potatoes to the plains so great that these sacks are yearly advancing in price, and a considerable trade in them exists at Rámnagar and Kotdwára.

Prospects of the hemp industry.

Mr. J. H. Batten, in one of his reports, gives the following opinion on the prospects of hemp cultivation in Kumaun :—"If a large demand for hemp, the produce of these mountains, were to arise and it were to become generally known that capital to a considerable amount was ready to be expended for the purpose of procuring the article, a very great increase of hemp cultivation might be expected even in Kumaun Proper, but especially from the Chaugarkha parganah. If European capital should hereafter be employed in increasing the growth of the excellent hemp existing in this province, I should certainly recommend that the means first used for the purpose should be an outlay of money in advances to and purchases from the present growers and manufacturers, rather than in the attempt on the part of any enterprising individuals to procure land and grow hemp for themselves. Notwithstanding their prejudices, I think that the example of their neighbours, if the latter attained to any fair degree of prosperity from the increase of trade, would soon be followed by many villagers throughout Kumaun, who now are indifferent to or despise their advantageous situation for the growth of hemp, and large tracts of land now waste would be brought under cultivation. There are not in Kumaun, as in Garhwál, many waste villages still left unowned and unclaimed; and from what I have seen of the character of the people in Kumaun Proper, I think that any stranger who should purchase or rent land within the boundary of a village, for the purpose above indicated, would be quite as liable to litigation, inconvenience with his neighbours, and prejudices against his position, as in any part of India, however populous in comparison. In the case of advances and purchases on the contrary, the transactions of capitalists would be confined to simple contracts, of a nature to which, if found necessary, the law is open at a cheaper cost, and under simpler forms, than in most other parts of the country." Captain (now Sir Henry) Ramsay, in a report on the same subject, writes :—" I would not advocate the system of making advances to individual cultivators: it is not improbable that some ill-disposed persons might create a suspicion that Government intended evil instead of good and actually produce the effect of making those who now grow hemp discontinue its cultivation for a time ; the best plan I think would be to enter into engagements with respectable zamindárs for large quantities and allow these contractors to make their own arrangements. The cultivators are quite equal to taking care of themselves in such dealings."

Cultivation in Nepál.

Hemp is also grown in the northern parganahs of Nepál, and the mode of cultivation there is thus described by Mr. B. H. Hodgson :— " The seed is sown from March to April. Damp soils, comprising black earth, are fitted for this crop. Before ploughing the field, sufficient manure is to be sprinkled over it, then completing the work of the plough, the seeds are to be sprinkled, and having broken the clods into dust, the field is to be made even. At seven or eight days after sowing the seeds the plants come up, but their rapidity of growth and their size and strength depend on the abundance of the rains or artificial watering. If the plants be very thick, they must be thinned, so as to stand three inches distance from each other. They flower and fruit in Sáwan (July), and at the beginning of Bhádon (August) are in their full growth ; but while yet succulent and in flower they are to be cut, with the exception of some seed plants, which are not to be gathered until October. It is the bark of the young but full-grown or Sáwan plants (which is soft) that is used for making *bhangela.* That of the old or October plants is hard and not suitable for manufacture. After the plants have been cut off at the ground, they must be placed in the sun for eight or ten days, or until they be dried sufficiently. They must then be steeped in water for three days, and on the fourth day the plants must be taken out of the water and peeled. The peelings are to be washed and put in the sun ; and when quite dried, they are ready for manipulation. They are then to be torn into thin threads with the nails of the hands; next twisted with a spinning-wheel (*tikuli*), and when the threads are thus prepared, they are to be boiled with ashes of wood and water in a pot for four hours, and to be washed again for the purpose of whitening. This is the way of preparing *bhangela* thread, out of which sack-cloth is woven. One *mána* (half a *kachcha ser*) of seed is sufficient for a *ropini* of land (one-fifth of a *bádshdhi bigha* or 605 square yards), which produces ten or twelve loads of *bhang.* Hemp grows equally well on slopes and flats, and near the tops as well as on the sides of the mountains, if not too low. But a moist rich soil is indispensable. The plant attains to a height of eight to ten feet, and should be cut when the flower is falling and the seed forming." For an account of its cultivation in other countries, see Royle (*Fib. Pl.*, 333).

Hemp prepared for the European market should have the fibres laid parallel to each other and then be simply tied near the thicker end, so as to form heads like the Petersburgh hemp, not twisted, plaited and tied, as is the custom in our hills. The Himálayan hemps show strength, divisibility, fineness and softness of fibre—in fact all the essentially good qualities which a fibre should possess.

Chamærops 'Martiana, Wall., the *jhangra, jager,* and *thákil* of Kumaun, occurs on Bhatkot, Thákil, Dhuj, and in the valley of the

Sarju. The fibre is used for cordage and the leaves for mats and baskets. Brandis, 546.

Calamus Rotang, Linn.—Rattan—*bet;* occurs abundantly in the Eastern Dún, in places in the Siwálik tract and along the outer hills eastwards. It yields the common rattan so much used in upholstery and for basket work. Brandis does not consider *C. Royleanus,* Griffith, as distinct. This species has also its western limit in the Dehra Dún and is known under the same vernacular name and used for the same purposes. About fifty bullock-loads are exported every year from the Kumaun forest division. Brandis, 559.

Typha angustifolia, Linn.; Var. *elephantina,* Roxb.—*Bora.* This species occurs throughout the North-Western Provinces and Oudh, ascending the hills in the Káli valley, and indeed in most of the valleys bordering on the plains. It is the *reri* of the upper districts, and the variety *elephantina* is the *paderi* or *pateri* of the hills. The leaves are much used in the manufacture of soft matting, and from Kumaun alone about twenty bullock-loads of the raw material and 3,500 pieces of the matting are exported every year. *T. latifolia,* Linn., is called *patera* in Bijnor and *kandu-tela* in Garhwál, and the leaves are largely employed in the manufacture of a coarse matting called *boriya,* of which some 900 maunds are annually exported from Kumaun. In fact these two species afford the chief matting materials in common use. I am not aware that the leaves have ever been used for other purposes. Roxburgh, 648: Drury, F. P., III., 495.

Arundo Karka, Roxb., the *kurka* and *nal* of the Kumaun Bhábar, is of common occurrence in suitable localities. *A.* (*Phragmites*) *Roxburghii,* Kunth., is the *bichhra* of Garhwál and the *khaila* and *khailuwa* of the Kumaun Bhábar, ascending up to 3,500 feet in the valleys. *A. nepalensis* is the *nal, nal-turu,* and *tot-nal,* common in the Bhábar and found at Bhím Tál. All these are sent to the plains under the generic name '*nal*' and are applied to cane-work in chairs, matting and similar uses, and the fibre of the flower-stalks is manufactured into rope. About 220 bullock-loads are yearly exported from the Kumaun forest division. Roxburgh, 117.

Saccharum Munja, Roxb.—*Múnja.* The upper half of the culm is known as *sirki-múnja* or *sirki;* the lower half as *sentha* or *sarpat;*

the blade twisted and beaten yields the strong cordage known as *múnj;* the tufty leaves are called *sarkara* towards Hardwár. *Múnj* abounds along the banks of rivers and in sandy places and generally along the base of the hills from the Jumna to the Sárda and up the valleys to 3,500 feet. The fibre is made from the sheathing leaves of the culm and forms the material from which the *janeo* or sacrificial thread of the Hindus is made. *Múnj* is commonly employed as a tow-rope from possessing great elasticity and strength, with a power of resisting moisture common to few other fibres. It is also used for the rigging of boats, the bottoms of cots, chairs, and footstools, matting, in the manufacture of coarse paper, and as a string for fastening the bambu framework for the roofs of houses, and indeed for all common purposes in every district. The *sirki* is used for thatching, a covering or pawlin for carts, and for chairs and the like. Under the names *bínd* and *múnj* a considerable amount of the various products of this grass are sent to the plains. The returns for four years from Kumaun give an average export of 1,600 bullock-loads of the unmanufactured article and about 75 maunds of the rope. Drury, F. P., III., 653.

Saccharum spontaneum, Linn., is the *kásh, jasha* or *jhánsh* of Kumaun, according to Madden. It occurs commonly in the Bhábar and lower hills and is found near Almora, where its long-rooting surculi are substituted for the *kusha* grass in religious ceremonies by the local Brahmans. The leaves yield a thatching grass and matting material and a fibre useful for string for common purposes. Roxburgh, 79. *Eragrostis cynosuroides* under the names *dábh* and *kusa* is used in the religious ceremonies of the Hindus.

Saccharum fuscum, Roxb., is a common reed of the Bhábar, where it is known as *tát, neja* (grass), and *mora;* it is the *kilik* of the plains. The culms are used in the manufacture of screens and pens. The average annual export of this reed from Kumaun amounts to over 800 bullock-loads. Drury, F. P., III., 653: Roxburgh, 79.

Saccharum Sara, Roxb., is the *sarhar* or *sarúr* of the submontane tract, where it is very common. This reed is also used as a matting material and for chairs and the like, but the fibre is inferior to that of *S. Munja,* with which it is often confounded.

It is said, however, to be employed as a tow-line in Mirzapur, and must therefore possess tenacity and strength. Roxburgh, 82.

Eriophorum comosum, Wall., *Scirpus comosus*, Roxb.; *bábar*, *bab*, *bábila*, and at Almora *pan-babiyo*, only found in the Siwáliks and in low hot localities in the interior on base and steep slopes. It forms but a small portion of the fibre exported to the plains as *bábar* or *bhábar* grass. The *jhúla* or rope bridges erected where *sangas* or planked bridges cannot be made are chiefly formed of this fibre in Kumaun. They are safe for men and sheep and last about a year, when the ropes require renewal. The *chhínkas* or bridges of a single cable bearing a transverse seat are sometimes made from it, and it is also extensively used in rafting timber. The principal portion of the *bábar* grass of commerce is derived from the *Spodiopogon angustifolius*, Trin. Drury, F. P., III., 530

Cyperus tegetum, Roxb.; *Papyrus pangorei*, Nees ; *motha ;* grows wild and is also cultivated on the edges of inundated fields for the sake of its culms, which form an excellent material for matting. The culms whilst green are split into three or four pieces, which, in drying, contract so much as to bring the margins into contact, in which state they are woven into mats and thus show nearly a similar surface on both sides. *C rotundus*, Linn., also known as *motha*, is applied to similar uses in a lesser degree. Roxburgh, 68, 70.

Imperata arundinacea, Cyrill., is the *shiro* of the Bhábar and lower hills, ascending to 7,500 feet. The culms are used for the same purpose as those of *múnj*, and the leaves for thatching and matting. Drury, F. P., III., 652.

Anthistiria arundinacea, Roxb., is the *ulu;* *ullah*, *kangúr* and *kandúra* of the Bhábar and affords the same products as the preceding. Drury, *l. c.*, 650.

Anatherium muricatum, Beauv., is the *gandar* of the submontane tract. The roots are commonly known as *kas* or *khas* and the culms as *sínk*. The latter are exported from Kumaun with the *sirki* of the *múnj* under the same name and are used for the same purposes. The roots are exported for making tatties, dyers' brushes, and fans. Drury, *l. c.*, 644.

Spodiopogon angustifolius Trin.; *Andropogon involutus*, Steud.; the *bábar* of the tract from the Jumna to the Sárda. Dr. J. L. Stewart writes :—"This grass, which is abundant in the Garhwál Himálaya and occasional on the skirts of the Siwáliks, appears to furnish almost all the material called *bábar* so largely used for string in these parts (Bijnor). Botanists from Wallich and Royle downwards have stated this to be the produce of *Eriophorum comosum*, of which, however, only a very small proportion of that brought to the plains consists. Dr. Brandis first drew my attention to the probability of the ordinary belief being erroneous, and subsequent inquiry has shown the case to be as above stated. The string is very coarse but strong, and, although there is great waste in the manufacture, exceedingly cheap. It is well adapted for boat-ropes, the rope-work of bedsteads and other ordinary purposes. Possibly the *bábar* may come into play as a paper material ; at least it is worth the trial, and probably larger quantities of the raw article could be got than of any other fibre in this part of the Himálaya." (J. Agri.-Hort. Cal., XIII., 293). The raw material is procurable for about eight annas per maund and the fibre at four times that price. About 25,000 bullock-loads are yearly exported from the Kumaun forest division.

Cymbopogon laniger, Desf.; *Andropogon Iwarancusa*, Roxb.; is known variously as *miriya*, *bán*, *ganguli*, *dáb*, and *píriya* in the submontane tract. It ascends the hills up to 5,000 feet at Almora and is found along the Sarju as far as Bágeswar ; flowering in April. The culms are exported with those of the *mora* for similar purposes, and the leaves are used for thatching and coarse matting. The culms and leaves of *C. Martini*, Munro, are applied to similar uses. Roxburgh, 92.

Bambus.—The genera included under the common name bambus are sufficiently numerous and important to deserve special notice here in connection with their use as a half-stuff for paper-making. Following the arrangement of Brandis, we shall briefly refer to each in the order given by him in his 'Forest Flora':—

1. *Arundinaria falcata*, Nees—*Ningál*. Madden notes that the people of the Dánpur pargana in Kumaun enumerate no less than eight kinds of *ningála* or *ringál* as it is pronounced in Garhwál,

viz.,—*tham*, *utham*, *kutino*, *malingo*, *jhúmro* or *jhúngra*, *deo-ningála*, *gorningála*, and *dom-ningála*. The last is probably the common or *káli-ningála* found abundantly along the Gágar range, and, like the *jhúmro*, in much request for pens. Dr. Falconer referred it to the genus *Thamnocalamus*. The *tham* is said to be the largest of the whole and is sent down to the plains for hukka pipes. The *deo-ningála* is the *A. utillissima* of Edgeworth, and occurs in great abundance in the snowy range, especially in the upper valley of the Pindar. It affords excellent material for matting, baskets, fishing-rods and the like. The *gor-ningála* is the *gol* of Bisahr, with their culms eighteen feet high, occurring in dense clumps of a hundred or more each. Brandis (p. 562) gives to *A. falcata* a range of 4,500-10,000 feet, ascending to 12,000 feet from the Ravi to Nepál, abundant in places, gregarious, often forming underwood in moist forests of *Abies Smithiana*, *A. Webbiana*, and *Quercus semecarpifolia*. It flowers in May and the seeds ripen in August.

2. *Thamnocalamus spathiflorus*, Munro—*Ringál.*

This is probably the *káli-ningála* of the preceding notice, occurring in Dánpur. It is recorded from Deoban in Jaunsár, Dúdatoli in Garhwál, and Kumaun at elevations 8,000-11,000 feet. *T. Falconeri*, Hook. *f.*, is also recorded from the Madheri pass in Kumaun. See Brandis, p. 563.

3. *Dendrocalamus strictus*, Nees.—*Báns.*

To this species belongs the great mass of the bambus exported as minor forest produce from the Jumna to the Sárda. For the Garhwál forests, Dr. J. L. Stewart gives the following classification of cut-bambus, beginning with the least valuable :—

1. *Chhanejú*, (*chhanejú*, K.), long and thin, used for roofing purposes.

2. *Láthi or láthichár* (*láthi-báha*, K.), thicker, shorter, solid, for walking-sticks and clubs.

3. *Bálu*, similar, but thicker, for sides of cots.

4. *Kanerwa* (*kanderu*, K.), between the last two in thickness, but chiefly used for roofing purposes.

5. *Sardicha* (*sardinchu*, K.), much thicker, shorter, hollow; also used for roofing purposes.

6. *Dashatta*, similar, but much longer.

7. *Bhengi* (*bahaga*, K.), thickest of all and less hollow, used for tent and dooly poles. See further Brandis, p. 569.

Bambus form the most important portion of the minor forest produce of all the forest divisions and one that increases in value every year, but it is to the materials for half-stuff in paper-making which they afford that we wish to invite attention here, and for this purpose will refer to a paper[1] by Mr. J. Routledge on the subject. In his opening paragraph, he writes :—"Of all the fibre-yielding plants known to botanical science there is not one so well calculated to meet the pressing requirements of the paper-trade as 'bambu,' both as regards facility and economy of production as well as the quality of the 'paper-stock' which can be manufactured therefrom. Grown under favourable conditions of climate and soil there is no plant which will give so heavy a crop of available fibre to the acre and no plant that requires so little care for its cultivation and continuous production." Attempts have been made in England to obtain from the bambu a half-stuff or pulp for paper manufacture, but these have failed chiefly from using the plant when it had attained to some degree of maturity and the fibre had become extremely dense and the external skin hard and silicious. In this state the processes for softening the material and converting it into pulp by long-continued boiling or digesting in very strong solutions of caustic alkali at a high temperature were troublesome, expensive, and dangerous. Mr. Routledge would therefore take the young plant, and by a system of close plantations well watered and systematically cropped ensure successive growths available for preparation into stock. His estimate is as follows :—"Allowing 208 feet square to represent one acre divided into twelve beds each 96 × 26 feet with twelve paths 96′ × 8′8″ wide and one intersecting road 208′ × 16′ wide, leaves a space for planting equal to 2,496 feet, or 29,952 feet in the twelve beds; allowing the stems to be 2 feet apart and (say) only 12 feet high, we have 7,488 stems, which at 12℔ each will yield 40 tons to the acre." Assuming that these 40 tons of green stems will lose 75 per cent. of moisture in drying, we have 10 tons of dry stems to the acre, which will yield 60 per cent., or six tons of unbleached fibrous paper-stock baled up in merchantable condition. It is unnecessary to enter into Mr. Routledge's system of treating the bambu for the manufacture of paper-stock, our object being merely to show that a practical paper-maker considers it possible to turn the preparation of bambu fibre into a profitable commercial speculation. Nothing has yet been attempted in this direction in India.

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[1] Bamboo considered as a paper-making material, by T. Routledge: London, 1875.

WOODS.

Timber trees.

The timber-producing trees of the Himálaya of these provinces are sufficiently described in the admirable work of Dr. Brandis on the *Forest Flora of North-West and Central India*, to which the reader must be referred for descriptions of those trees noticed hereafter and of those which do not claim a reference in a work like the present one. The forests themselves will be enumerated in the succeeding chapter, and here we shall only refer generally to their more valuable timber-products. The forests below the hills and those clothing the outer spurs contain *sál*, *sisu*, *tún*, and trees belonging to the genera *Acacia Terminalia*, *Anogeissus*, *Adina*, and *Stephegyne*, besides the grasses popularly known as bambus, all of which are of the first importance for house-building, furniture, agricultural implements and boat-building. From them is derived the greater portion of the revenue in the State forests, and omitting them, there would be little of any practical value to record. In the upper hills, the conifers clothe almost every ridge and valley within the zone of arboreous vegetation, and with oaks and rhododendrons, the box, maple and birch afford, if proper precautions be observed, an inexhaustible supply of every class of wood equal in quality to that procurable in Europe. The *sál* of the submontane tract and the cedar of the hills are held in the highest esteem and have been much worked in all easily accessible forests, but there are other trees that afford a timber equally suitable for most of the purposes to which the former are now applied. The *búkli*, *sain*, *haldu*, and *gosam* of the submontane tract and some of the oaks, the pine, spruce and fir of the hills give very valuable timber fit for everything except perhaps railway-sleepers, and it will be necessary, should the existing demand continue, to call on the reserve of these trees to supply all common wants. This can best be done by raising the duty on the more valuable timber, and the sooner a movement of this so t is made, the better it will be for the future of the *sál* and *deodár* forests, which now require rest and care. Bambus have already been sufficiently described on a previous page (p. 809), and it will not be necessary to notice them further here. We shall, therefore, restrict ourselves to a brief description of the most important trees in the forests of the submontane tract and of the conifers, oaks, and a few other timber trees in the hills. All of these have an ascertained value and are the chief sources of the timber supply for the plains.

Shorea robusta, Gœrtn.—*Sál, kandár, sákhu* (plains). Brandis, 26 : Hook., I., 306. The *sál* occurs along the foot of the hills from the Jumna to the Sárda and also in the Dúns. It ascends the hills in places to 3,000 feet and is found in the valleys to a great distance inland, notably along the Sarju and Rámganga. It is the most valuable and most sought after of all the timber trees of the submontane forests and from time immemorial has been exported to the plains. It is usually the characteristic tree of the tracts which it affects, and though other trees occur, the *sál* predominates. In the Pátli Dún and other places where pure *sál* forests exist and thrive, the soil is usually composed of alluvial deposits, and drift in the valleys and plateaus and sandstone or conglomerate interspersed with blue shale on the ridges. Brandis notes that the climatic conditions favourable to its growth are a rainfall of 40-100 inches and a mean temperature during the four seasons within the following limits :— cold-season, 50-70°: hot season 77-85°: rainy season, 80-88°: autumn, 74-77°. The *sál* grows, as a rule, to a height of 60 to 90 feet with clear stems 30-40 feet long and 6-8 feet in girth. Further east under Nepál it attains much larger proportions and measurements are recorded of trees 100-150 feet in height and 20-25 in feet girth. Captain Wood has estimated the growth to be on an average (in the Oudh forests) 54 feet in 65 years and 72 feet in 95 years. The wood is reddish coloured, coarse-grained, even-fibred, hard, strong, tough, and so heavy that it cannot be transported by water without the aid of floats. The average weight of a cubic foot is 50-60lb.—with variations 40-69lb.—and its specific gravity is over 1,000. The transverse strength as ascertained from numerous experiments varies from 609 to 972. Baker found that a six-feet bar, two inches square, broke at 1238℔., and Brandis also records a number of experiments.

Cedrela Toona, Roxb.—*Tún, túni.* Brandis, 72. The *tún* is not now very common west of the Rámganga except in the low moist valleys leading into the Pátli Dún and in parts of the eastern Dehra Dún, and even to the east of that river the reserves have been denuded of most of the mature trees. The *tún* attains a height of 60-70 feet, with a girth of 6-10 feet. The heartwood is close-grained, hard, capable of taking a high polish like mahogany, and when properly seasoned is deservedly known as an excellent furniture wood. A cubic foot weighs 29-36℔, and the co-efficient of transverse strength ranges from 420-560. In one of Baker's experiments, a six-feet bar, two inches square, broke at 800℔. Stewart notes the interesting fact that in the small family to which the *tún* belongs there are four other valuable timber-trees, only one of which, the mahogany (*Swietenia Mahogani*), is extra-Indian. The others are Satin-wood (*Chloroxylon Swietenia*, D. C.) ; rohuna (*Swietenia febrifuga*, Roxb.), and Chittagong wood (*Chickrassia tabularis*, A. Juss.), all of which are indigenous in Southern India and the last also in Eastern Bengal. The *tún* ranks as a first-class timber in the forest tariff. The wood of *C. serrata*, Royle (Brandis, 73) the *dala* of Kumaun and 'bastard-toon' of Europeans, is of a lighter colour than that of the true *tún* and is used in the hills for house-building and the like.

Schleichera trijuga, Willd.—*Gosam, gausam, kosam.* Brandis, 105. This tree occurs in the Siwálik tracts and Dúns, ascending the valleys to 3,000 feet. It attains a height of 60-70 feet and a girth of 5-6 feet. The wood is reddish brown, close-grained, tough, hard and heavy, and weighs 66-70℔. to the cubic foot. It is much used for the crushers (*chúran*) for oil and sugarcane mills, pestles, rollers, agricultural implements and carts, and all work in which toughness and strength are desirable.

Dalbergia Sissoo, Roxb.—*Shísham, sissu.* Brandis, 149 : Hooker, II., 231. The *sisu* occurs throughout the submontane tract and Dúns in moist places on the banks of streams and on islands in the rivers. It attains a height of 40-60 feet, with a girth of 6, and in very rare cases up to 12 feet. The sap-wood is light coloured and the heart-wood is of a deep brown colour, close-grained, hard and capable of taking a high polish. A cubic foot of seasoned wood weighs 45-50℔., of unseasoned wood 64-70℔. The co-efficient of transverse strength ranges from 700 to 900, being superior to nearly all other woods. A six-feet bar, two inches square, broke at 1,104℔. in one of Baker's experiments. *Sisu* is useful for all work requiring strength and elasticity, and is much employed for furniture, house-building, boat-building, carts, beds, saddle-frames, and agricultural implements. It is considered a first-class wood in the forest tariff.

Ougeinia dalbergioides, Benth.; *Dalbergia Oogeinensis*, Roxb. —*Sándan*, *sánan*, *chándan*. Brandis, 146 : Hooker, II., 161. It occurs chiefly in the valleys of the outer hills, ascending to 5,000 feet and attains a height of 40-50 feet with a girth of 3-5 feet and occasionally 7-8 feet. The wood is close-grained, hard, strong, tough, and very durable. A cubic foot weighs 57-60℔., and it is much valued for wheels, ploughs, furniture and indoor household work. It is one of the first-class timbers in the forest tariff.

Acacia Catechu, Willd.; *Mimosa Catechu*, Linn., *M. Sundra*, Roxb.—*Khair*. Brandis, 186. The *khair* occurs along the sub-montane tract and in the Dúns, ascending the valleys to 3,000 feet. It has been much worked for the extraction of *kath*, and in the more accessible tracts few large trees remain. It attains a height of 30-40 feet, with a girth of 4-6 feet and occasionally 8-10 feet. The heart-wood is of a deep red colour, close-grained, hard, tough, elastic and heavy. It is admirably suited for crushers (*chúran*) for oil and sugarcane mills, and for this purpose yields only to the tamarind. It is also largely used for axles, pestles, pins, plough-shares, cotton-rollers, wheels, bows, spear-handles and the like, and is one of the most valuable of the second-class woods. Its product, *kath*, has been noticed elsewhere (p. 775).

Terminalia tomentosa, W. *et* A.; *T. crenulata* and *coriacea*, W. *et* A.; *Pentaptera crenulata*, *coriacea*, and *tomentosa*, Roxb.—*Sain*, *sein*, *asain*, *sáj*. Brandis, 225. This tree is common in the submontane tract and the Dúns, attaining a height of 80-100 feet, with a girth of 8-10 feet. The heart-wood is dark-brown, tough, strong, elastic, and very durable. A cubic foot of seasoned wood weighs 60℔, varying from 50-70℔. The co-efficient of transverse strength is 860, varying from 591-1,104. In one of Baker's experiments a bar six feet long and two inches square broke at 903℔. It is used for indoor household work, carriage shafts, agricultural implements, rice-pestles and boat-building, and is one of the best of the second-class woods now coming into general use.

Terminalia Chebula, Retz.—*Har, harara.* Brandis, 223. This tree occurs in the Siwálik tract and outer hills ascending to 5,000 feet and along the hot valleys in the interior. It attains a height of 60-80 feet and a girth of 5-10 feet. A cubic foot of seasoned wood weighs 54-60℔. The timber is of a brownish colour, close-grained, heavy, capable of taking a high polish and fairly durable. It is used for furniture, indoor household work, and agricultural implements. *T. belerica,* Roxb., the *bahera* of the submontane tract, yields an inferior wood, of little value, though used for planks.

Anogeissus latifolia, Wall., *Conocarpus latifolia*, Roxb.—*Dhauri, bákli, dháwa.* Brandis, 227. This handsome tree is common over all the submontane tract and is found in Debra Dún, imparting a fine copper tint to the foliage of the forests in winter. It attains a height of 60-70 feet, with a girth of 6-9 feet. The timber is close-grained, of a brown colour, hard, tough, and elastic. A cubic foot of the seasoned wood weighs 57-65℔, and of the unseasoned wood 75-80℔. The co-efficient of transverse strength, according to Skinner, is 1,220, but is placed much lower by others. From its elasticity, the *bákli* variety is especially fitted for cart-poles, axles, axe-handles and the like, and it is gradually coming into great demand as the prices of the superior timbers have risen. It is well fitted for all house-building and agricultural purposes, though said to be not very durable when exposed to moisture. The bark of the *bákli* variety appears to be of a lighter colour than that of the *dhauri* variety, while the leaves are smaller and it grows to a greater height.

Adina cordifolia, H. *f. et* Benth.; *Nauclea cordifolia*, Roxb.—*Haldu.* Brandis, 263. The *haldu* occurs abundantly in the open plain along the foot of the hills from the Sárda to the Rámganga and less commonly westwards through the Dehra Dún to the Jumna. It ascends the valleys to 3,000 feet. It is not gregarious and is remarkable for its trunk being often buttressed like that of the *semal*. Trees 60-100 feet high and with a girth of 10-18 feet are not uncommon in the Bhábar. The average weight per cubic foot is 42℔., varying 36·3-49℔. The co-efficient of transverse strength is about 700. The wood is yellow, smooth fibred and fine-grained and is fairly durable. It seasons well, works easily and takes a fine polish, and is suitable for turnery, though sometimes apt to warp and crack. It is now much used for indoor household work, planks, boxes, the keels of boats, combs, writing-tablets, gun-stocks, and agricultural implements.

Stephegyne parvifolia, Korth.; *Nauclea parvifolia,* Roxb.—*Kaim, kangai, phaldu.* Brandis, 262. This tree is gregarious, though occasionally met solitary in the open plain. It grows to a height of 50-60 feet, though specimens of 80 feet have been recorded and the average girth is 6-7 feet. The weight of a cubic foot of sea soned timber is 35-47℔., of green timber 54℔., and the co-efficient of transverse strength is 586-683. The timber is durable if not exposed to moisture and is applied to the same purposes as the preceding. This and all other woods of the sub-montane forests, except *sál, sissu, tún,* and *sándan* come under the designation '*Katrukh.*'

Quercus semecarpifolia, Smith—*Karshu, sauj.* Brandis, 479. This species occurs at high elevations 8,000-10,000 feet. Madden records it at Naini Tál. It attains a height of 70-80 feet, and a girth of 7-8 feet is not rare. It grows slowly and gives a hard, heavy timber that will not easily bear export, but on the spot is used for house-building, bedsteads, poles, helves and ploughs. It is said to warp on exposure and to be liable to the attacks of insects.

Quercus lanuginosa, Don.; *Q. lanata,* Wall.—*Rianj, rai-bánj.* Brandis, 481. This species occurs at Naini Tál and a few other places in Kumaun, 6,000-7,500 feet. The word is of a greyish-brown colour, hard and very heavy, and is not easily worked. It is much liable to the attacks of a small black hymenopterous insect which often riddles it completely in a few years.

Quercus dilatata, Royle ; *Q. floribunda*, Lind.—*Tilonj, kilonj, moru.* Brandis, 482. This species is common on the outer ranges from the Jumna to the Sárda at 4,500-9,000 feet. Pearson notices the noble forests of this oak in the valleys of the Bhágirathi and Jumna rivers. It attains a height of 80-90 feet and a girth of 8-9 feet, and Madden records one 100 feet in height and 19′ 8″ in girth. The wood is of a brownish colour, hard, durable and heavy. It is used for agricultural purposes and house-building and is considered the best of all the oaks for carpentry.

Quercus incana, Roxb.—*Bánj.* Brandis, 482.

. This species is common on the outer hills from the Jumna to the Sárda. It generally attains a height of 20-30 feet, with a girth of 4—5 feet. The wood is used for house-building and agricultural purposes and ranks second to the preceding in popular estimation. Madden records *Q. annulata*, under the names '*phaliaut*' or '*phaniat*,' as occurring in Naini Tál ; it is the *pharonj* of Eastern Garhwál.

Buxus sempervirens, Linn.; *B. Wallichiana*, Baillon.—Box—*Pápari.* This tree occurs in the upper hills at 6,000-8,000 feet and is common in the Bhágirathi, Jumna, and Tons valleys. The wood is very close-grained, hard and heavy, weighing 60-65℔. per cubic foot, and selected pieces are fitted for all the purposes to which European box is applied.

Acer oblongum, Linn.—*Patangliya, kirmali.* Brandis, 110. This species occurs up to 6,000 feet in the great valleys. It is used for agricultural implements and from its knots some of the better wooden drinking-cups exported to Tibet are made. A considerable number of these cups are made from the knots of *A. pictum*, Thunb., which is common in the hills above 7,000 feet, and is also used for agricultural purposes and house-building.

Betula acuminata, Wall.—Himálayan Birch—*Puya-udish* or *utis*, Brandis, 458. This tree occurs in sheltered places 6,500-10,000 feet on all the outer ranges. The wood is close-grained and takes a fine satin polish. It is particularly good for panels for doors, and the examples in the Government-house at Naini Tál show that it is a valuable acquisition for ornamental work. The alder, known as '*udish*,' is the *Alnus nepalensis*, Don., which occurs at lower elevations and is also used for house-building purposes and gives a fair-sized log, from which planks may be cut for tea-boxes and the like. The wood is light and somewhat brittle, but takes a satiny polish like the birch. The people towards the snows use the bark of the silver birch (*Betula Bhojpatra*, Wall.; Brandis, 457) for writing and packing in place of paper.

CONIFERS.

Conifers.

As already noticed, the conifers constitute the most valuable section of the timber-producing trees of the upper Himálaya both for quantity and quality. In many parts of the country they occur in unbroken masses extending over many miles and present a scene of magnificent grandeur unknown elsewhere. Each species has its own peculiar beauty, but perhaps the wide-spreading cedar with its branches almost reaching to the ground is the finest and well deserves the epithet 'divine-tree' given to it by the old Hindu poets and still in common use to designate it from Kashmír to the Ganges. We have added Stewart's analytical key to the conifers and a list of vernacular synonyms compiled from the writings of Cleghorn, Madden, Stewart, and Brandis, which seem necessary in order to understand the very confusing local nomenclature :—

Analytical key to the chief arboreous Conifers of the North-Western Himálaya by the late J. L. Stewart, M.D.

	1.—Pinus longifolia, *Roxb.*	2.—P. Gerardiana, *Wall.*	3.—P. excelsa, *Wall.*	4.—Cedrus Deodara, *Loud.*
Crown ...	Young, ovate; older long ovate, with broadish top.	Short ovate, bushy ...	Conical, long ovate ...	Pyramidal, ovoid conical, or compressed columnar.
Branches of a tree in the open.	Begin high, droop somewhat, then upcurved.	Begin low, straightish, horizontal, curving up at ends.	Begin low, sub-horizontal, ends upturned, when not fruit-laden.	Begin low, straight horizontal.
Colour of the foliage.	Young, light; old, dark green,	Darker green than 1, and grey branches showing through.	Bluish or greyish green ...	Lightish green, young; very dark, old.
Bark ...	Rough, grey plates, and deep irregular furrows.	Large, long, greenish-grey plates, peeling off, darker under.	Dark, smoothish, furrowed into irregular, small whitish plates.	Dark, smooth, cut into long, narrow scales, by vertical fissures.
Leaves ...	6-18" long, in 3s, stiff, erect, in persistent sheath, 6"-12" long.	3" long, in 3s. Stiff in deciduous sheath.	6-7" long, usually in 5s, thin, drooping, sheath caducous.	1" or more long, trigonous, stiff, sharp, in tufts of 30-40, on short branchlets, at last scattered.
Duration of leaves.	2-3 years	2-3 years	4 years	5 years.
Cone ...	Pendulous sub-globular or ovate, young; old conical, 5-7" long, 13" girth at base, brown.	Erect, young sub-globular old ovate oblong, narrowed upward, 6-9" long, 14-15" girth low, bluish.	Pendulous, tight, conical, cylindrical, 6" long, 5-8½" girth, resinous young bluish green.	Erect, thick cylindrical, oval or oval-oblong, obtuse, 3½-4" long, 7½-9" girth, dark brown.
Scales ...	With very thick knobby points, persistent.	Thick, spinous apex, persistent, seed edible.	Close imbricate, acute edged, terminal thickish umbo persistent.	Close imbricate, broad, thin, deciduous.
Ripe ...	(October) April-May ...	October	October	October.

	5.—Abies Smithiana, *Forb.*	6.—Picea Webbiana, *Lind.*	7.—Cupressus torulosa, *Don.*	8.—Taxus baccata, *L.*
Crown ...	Tall, narrow, cylindrical ...	Very narrow, cylindrical ...	Long conical, like garden cypress.	Broad oval, irregular.
Branches of a tree in the open.	Begin low, horizontal, or downward, with tassel-like twigs.	Begin low, short, declined ...	Begin lowish, of young horizontal, sub-declining; of old horizontal, with drooping, sub-divided tips.	Trunk short or none, branches lax, irregular.
Colour of the foliage.	Like 3, but with a rather darker tinge.	Very dark	Young, bluish green; old, darker, like (but browner than) 6.	Darkish green.
Bark ...	Very smooth, cut into small quadrangular plates by shallow furrows.	Young, smooth silvery; old, grey, cut into long narrow scales by anastomosing spiral clefts.	Brown, smooth, sulcate, fibrous, peeling off in long stripe, often sub-twisted.	Young, silvery, old, smooth, brown, fibrous, compact, not sulcate, peeling off in layers.
Leaves ...	1½" long, compressed tetragonal, stiff, sharp, solitary. scattered all round branches.	2" long, 2 pointed, a silvery band on each side under, quasi-bifarious.	Scale-like, quadrifariously close imbricate.	Flat, falcate, entire, sharp mucronate, alternate distichous.
Duration of leaves.	8-10 years	8-10 years	?	?
Cone ...	Pendulous from tips, oblong cylindrical, sub-narrowed upward 3-4½" long, 4¼-5¼" girth, brown or purplish.	Erect, sub-globular or oval cylindrical, narrowed above, 3-4½" long, 5-9" girth, dark purple.	Globular or sub-oval, 6" long, 1½" girth, fuscous, bluish, glaucescent.	Sub-drupe, 4-5½" long, 1¼-1½" girth, cup red, fleshy, nucule greenish olive.
Scales ...	Thin, membranous edged, persistent.	Broad, thin, dark, deciduous,	Each scale with 4-6 facets ...	...
Ripe ...	October	October	October-November ...	September to January.

Local names of the Conifers of the North-West Himálaya.

	Pushtu.	Hazárá.	Kashmír.	Chamba (Chináb and Ravi).	Kulu (Biás).	Basáhir (Satlaj).	Garhwál.	Kumaun.
Cedrus Deodara (deodár or cedar).	Nakhtar ... Lmanza.	Deodár ... Diar. Palúdár.	Deodár ... Diár.	Kalain ... Kilei. Kelú keoli. Kilár. Deodár, diár.	Kelu ... Keli. Keorí.	Kelon ... Kelu. Kiali, keltu. Keyúl. Kelmung (Kunáor). Gyam (Tib).	Deodár ... Diár.	Deodár Diár. Díwár.
Pinus excelsa (lofty pine).	Piuni ... (Káfir).	Biár ...	Chíl, chír ... Biár. Yári, yiro. Yur.	Chíl, chíltu ... Chíli, taer. Lhem, lhím. Yar. Shomshing (Lahoul).	Kail ...	Chíl ... Lím (Kunáor). Kail.	Kail ... Chíla. Darchilla.	Lím (Byáns). Rái-salla. Lamshing(Bhot).
Pinus longifolia (long-leaved pine).	Nakhtar ...	Chíl ... Chír.	Chíl ...	Chíl ... Dráb-chír.	Chíl ...	Chír-sthi (Kunáor). Chíl.	Kolon ... Kolain. Kalon. Salla, sallí. Saral (Jaunsár). Chíl. Thansa (Tíhri).	Salla. Chír. Sapin.
Pinus Gerardiana (Gerard's pine).	Chilghoza ... Jalghoza. Sanaubar-saghar (?).	...	Neoza(seeds).	Chiri ... Galgoja. Galboja. Mírri. Kashti (Ravi). Prita.	...	Ri (Kunáor) ... Rhi (ditto). Shanti (Tib). Kuminche (Shipki). Koniunche(ditto).	Konecha ... Kolecha.	Does not occur.

Abies Smithiana (Himálayan spruce).	Wesha Bajúr.	Kachan Kachal.	Kachal Kachan.	Tos, tosh Ráo, re. Rág, roi. Káuli. Bang re. Krok.	Sarai Rái. Rewári. Ban-lúdar. Sangal Salla. Salle.	Bhój-rai (Shatúl), Bang-rai (Rópin). Krok (Kunáor). Raiang, re. Roú (Kunáor). Rau. Kandrau. Kudrau.	Kandre, kail, kilu, Re, rhái, rho. Riálla. Rágha (local). Rái (Jaunsár). Téé (Bhot). Kudrau. Morinda.	Does not occur?
Abies Webbiana (Webb's fir).	...	Yalúdar (Jhelum). Rewari (Jhelum).	Rayal Badar. Búdar. Túng.	Dhunu Rág, sara. Rail, salle Pe, re.	Tos	Krok, kalrai Pindrow (Hattu). Pindrai (ditto). Thanera (Sháli). Chilrau (Chúr). Khatrou. Spun, pun.	Morinda Ráisalla. Rao rágha. Kúlu.	Rágha. Wúman (Byáns). Rausla Raisalla.
Cupressus torulosa (Himálayan cypress).	...	...	...	Debidiar	Deodár	Shúr (Kunáor)... Gaia, galrai. Galain (Sháli). Kalyán	Leor (Tirhi) Leori (Jaunsár). Súrúi. Súrye.	Saru. Súrúi. Surái.
Taxus baccata (yew).	Saráp? Badar	Birmi Túng.	Sangal Tung. Túni. Postil. Sungcha.	Dhono Chogú. Kautú. Barma.	Rakhal	Geli Thuna. Kadeurú. Rikhalung (Kunáor). Yamdal (ditto). Ikalung.	Thaner	Thanera. Thúna. Lúet (Juhár). Nhare (Byáns).
Juniperus excelsa (pencil cedar).	Apúra	Charái Chalái (Jhelam.)	...	Lewar, leor Shúr. Devdár.	...	Shúrbóta Shúrgu. Shúkpa (Tib). Neur-shúkpa. Shúr (Kunáor).	Lewar Dhúpri. Chandan.	Dhúp. Padmak (Bhot). Súrgi.

Pinus longifolia, Roxb.—Long-leaved pine. Madden, J. Agri.-Hort. Soc. Cal., VII., 75 : Brandis, 506 : Cooke, 125 : Roxb., 677.

The long-leaved pine. *Chír* (in Sanskrit "*kshíra*, or " milk"), *sula* (Sansk. *sarala*, " straight") in Kumaun ; *kolon*, *kolan*, *kolain* in Garhwál ; *saral* in Jaunsár ; *thansa* above the Dún ; *dhúp* in Oudh. To the west of Garhwál the name *chír* or *chíl* is applied to *P. excelsa*, except in Kunáor, where *P. longifolia* preserves the name *chír* with the indigenous affix '*stḥi*' or '*shthi*' (M.)

Distribution.

The *chír* occurs all through the Kumaun Division, dividing the forest with oak, from 1,600 feet above the level of the sea at Sítakoti, eight miles above Deoprayág in Garhwál, to 7,200 feet on the Pindar river. The limits at which it is found vary much in different parts of the Himálaya between Afghánistán and the Tísta, and apparently the upper limit descends the further east we proceed from Kumaun.[1] As a rule, however, 2,500 feet is the lowest height at which it seems to flourish. The *chír* appears to have the power of driving out all other vegetation from the tracts it occupies, and forests of these trees are interpersed only with scanty underwood of the smallest shrubs. Madden and Brandis note the curious phenomenon observable in many of these pines in Kumaun. This consists in the spiral arrangement of the bark and woody fibre, the coils being sometimes as much compressed as those of an ordinary corkscrew, and in some instances the stem itself is thus distorted. Straight trees are found mixed with these contorted specimens in the same forest in Kumaun, and they do not appear to occur in Garhwál or in the higher ranges in Kumaun. The straight variety is known in Kumaun by the term *sapin*. The wood of the straight variety is usually of a reddish white colour, and is preferred for building purposes, as the other is liable to warp and split in working, though in the log form capable of bearing heavy strains. It is, however, rarely used except as fuel. Dr. Jameson thinks the crooked variety is confined to localities with a southern aspect and under 5,000 feet, but the fact remains that crooked and straight trees occur in the same forest with the same aspect, as may be observed near Ganái and Pyúra.

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[1] Hooker gives the upper limit in Sikkim as 2,000-2,500 feet ; Griffith gives the lower limit in Bhután at 1,800-2,000 feet. At Ramesar bridge on the Sarju in Kumaun, 1,500 feet above the sea, it descends to within a few hundered yards of the river.

Webber's survey.

The forest survey of 1865-66 estimated the total area under *chír* as 413,650 acres in Kumaun and 152,264 acres in Garhwál. Many acres of forest contain 20 large and 50 small trees per acre ; but in a square mile the bare places bring down the average to 20 trees per acre. First-class trees are those having a girth at five feet from the ground of eight feet and over ; second class have a girth five to eight feet ; third class, two feet to five feet, and fourth class under two feet. The first-class trees average about one-twelfth, the second about one-fifth, and the third about one-third of the total number per acre. This would give a total of about twelve million *chír* trees in the Kumaun Division, of which one million belong to the first class.

The forests lying along the Gúmti, western Rámganga and eastern Rámganga approximately contain the following trees :—

	Acres.	*Trees per acre.*			
		1st.	2nd.	3rd.	4th.
Sources of the Gúmti towards Baijnáth ...	61,440	3	5	5	7
Upper Sarju from Kapkot and Phúngar valley to Bágesar.	42,380	2	4	5	6
Middle Sarju from Bágesar to Naini bungalow.	28,280	1	3	5	7
Lower Sarju and Rámganga from Naini to junction with the Káli.	40,020	2	3	5	7
Middle western Rámganga from Ramári ..	11,790	1	2	6	7
Lower western Rámganga and Katyúr river.	22,985	1	2	4	7
Between Bino and the Rámganga beyond Lohba.	32,300	2	5	8	12
Between Badhángarh and Latugarh ...	16,000	3	12	12	12
In the Tarág Tál valley ...	5,760	2	12	9	12
In the Gúmti valley ...	8,960	3	10	10	7
To the west of Budha Kidár and Bikya-kosain, to the east of Mási bungalow.	11,430	1	3	7	13
The Soni jungle	2,560	4	5	9	31

Nearly all these trees grow on slopes rising from the river-beds, and near enough to repay the cost of cutting and launching. The trees on the upper western Rámganga and its tributaries are mostly twisted, though towards Búngidár they are straight and so placed as to be easily shot into the Bino river. Following the stream of the Rámganga, the north-east banks from Garoth down to Bagri have first-class timber covering all the slopes of the Badhángarh and Gopálkot ranges, and could be easily worked into the Rámganga. The Syúni jungle near Chaun Debi is one of the finest in Kumaun. The large trees have all straight boles without a knot and with much red wood. The soil is light, micaceous sand on loose beds of earth and stones, which appears to be eminently suited to the *chír*. In Garhwál there are extensive *chír* forests in the valley of the Alaknanda and along the Pindar from Chuding (4,800 feet) to Gwáldam (4,300 feet), a distance of thirteen miles. In the three upper miles the timber is small, but lower down there are fine straight trees close to the river-bank, and a flat near Chiringa suitable for a timber depôt. All along here and up the Kailganga, for two miles, the forest could easily be worked. The forests on the Mandákini and Madmahesvar rivers have been worked for railway sleepers, but in many places the timber is too remote from the river for removal. The forests along the Nayár and Chhíphalghát rivers are extensive and yield good straight timber.

In native Garhwál there are almost inexhaustible forests of *chír*, along the Bhágirathi between Sainsu, some twenty miles above Tihri and Bhatwári, a distance of fifty-five miles. There are numerous patches along the head-waters of the Jumna and the Tons, and the left banks of both rivers are clothed with one immense forest capable of supplying all possible wants. Describing these forests Colonel Pearson writes:—"It would be difficult adequately to describe the enormous seas of *chír* forest which line its bank. In these the trees must be numbered not by thousands but by hundreds of thousands, and many of them are of huge size." The lower hills towards the Dún and the Siwáliks themselves contain large quantities of pine, and taking the entire forest area of the hills, the long-leaved pine may be considered the characteristic tree for quantity, but for quality it ranks below several other conifers. The great object at present is to find some inexpensive process for preserving it from the effects of exposure by creosoting or covering it with a permanent silicious coating. The *chír* grows even in the plains and specimens can be seen at Meerut and Saháranpur. It occurs, as we shall see, in every sub-division in the hills in abundance and in places from which it can be easily removed. It is often used for boat-building, but boats made of it seldom last for more than seven or eight years. Where *deodár* can be procured for the outside and *chír* for the inside the combination is excellent. *Chír* is easily worked into planks and beams and does well for interior work in houses. The bark is used in the preparation of charcoal for smelting iron. The knotty wood is used for torches, and the charcoal of the burned leaves with rice-water makes a fair ink. The growth of this pine may be calculated from observing the number of rings contained in a transverse section of the trunk. Of eight trees taken as a fair sample, Mr. Webber considered the largest, nine feet in girth and 200 feet high, to be 264 years old, and others, with an average girth of 5′7″ at five feet from the ground and a height of 93 feet, to be 154 years old. The growth is fairly rapid, averaging four or five rings to the inch. In the Turág Tál valley a fallen tree at five feet from the ground girthed 13′6″, and at 66 feet from the ground the girth was ten feet. The extreme height was 169 feet, of which over 100 feet were clear of branches.

The following table gives the measurements of several trees near Ránikhet :—

Aspect.	*Rings.*		Age in years.	Girth at 5 feet from ground		Girth at 50 feet.		Height.	Locality.
	Heart.	Sap.		Ft.	in.	Ft.	in.		
N. W.	15	50	65	3	3	1	0	75	Ránikhet.
S.	106	145	251	8	0	6	0	120	Elevation 5,000 feet.
N.	104	100	204	7	0	5	0	110	
N.	110	154	264	9	0	7	3	120	Syúni.
S.	52	23	75	3	8	...		75	Mansi mica rock.
S. E.	80	46	126	6	6	...		100	Ditto sandstone rock.
N. W.	28	52	80	4	5	...		60	Shaitángarh.
N. W.	80	90	170	7	6	...		80	Ditto.
S.	96	90	186	7	8	...		130	Pachár nadi.

The following table shows the result of experiments made in Almora in 1844 towards ascertaining the transverse strength of *chír*. As far as No. 10 the distance between the supports was four feet, and the bars used were two inches square. From 11 to 20 the distance between the supports was increased to eight feet, the depth of the piece used to 2½ inches and the breadth to 3 inches :—

Number.	Specific gravity.	Weight producing deflection of		Breaking weight	Remarks.
		½ inch lb.		lb.	
1	·545	540		1,000	Broke at a knot.
2	·570	624		1,144	Red coloured and rather knotty.
3	·552	568		940	Large coarse grained.
4	·596	1,112		1,372	
5	·596	1,000		1,444	
6	·670	1,036		1,420	
7	·634	820		1,132	
8	·673	940		1,288	
9	·710	1,036		1,540	
10	·600	764		1,304	Apparently the best piece, though all were very good,
		1 inch.	2 inch.		
11	·665	412	792	1,168	Coarse grain.
12	·726	680	1,324	1,763	Quite free from knots.
13	·707	636	1,288	1,744	A few small knots.
14	·615	484	976	1,756	No knots.
15	·625	568	1,132	1,420	Good wood, but broke at a small knot.
16	·591	456	844	1,168	
17	·585	400	764	1,208	
18	·575	490	1,036	1,648	Very evenly and fine grained.
19	·601	344	680	1,168	
20	·662	484	904	1,300	

The quality of the timber varies with the locality in which it has been raised, the slow-growing timber of the upper and colder regions being much better than that of the rapid-growing timber of the hot valleys, and from this fact may be derived an explanation of the difference in the results of experiments as to its strength and weight.

Pinus Gerardiana, Wallich. Neoza pine: Gerard's pine. The *rhi*, *ri* of Kunáor; *shangti* of lower Kunáor: *newr* further down the Satlaj; *ruminche*, *roníunchi* of Shipki and Hangrang; *ronecha*, *rolecha* of Juhár in Kumaun: *neoza* (the seeds).

The Gerard's pine is found between Malári and Bampa in the Dhauli valley in Garhwál, which seems to be its eastern limit, and locally in the upper valleys of the Tons and Jumna. It is generally associated with the cedar and is probably the *sanaubar-saghar* or 'lesser-pine' of Afghánistán, its height seldom exceeding 50 feet. It rarely gives a larger girth than eight feet and is preserved for its seed, which are collected and eaten and form a part of the *chilghoza* of the bazars. Brandis notes that the wood is used for the hook which supports the passenger's seat on the single-rope swing-bridge. Baskets and rough water-buckets are made from the bark. The cones are plucked before they open and are heated to make the scales expand and to get the seed out. The seeds are about an inch long, nearly cylindrical, with little or no wing, and are very palatable with a slight and not unpleasant flavour of turpentine. Large quantities of the seeds are stored for winter use, and they form a staple food of the Kunáoris, amongst whom the proverb is current, 'One tree, a man's life in winter.' The range varies from 5,800 feet (on the Marru river) to 12,300 feet near Sungnam. In Garhwál it occurs between 6,000 and 10,000 feet.

Pinus excelsa, Wallich, *P. Peuce,* Griseb.; *P. pendula,* Griff.—Lofty pine.[1] *Chíl, chír, chílu,* to the west of Jaunsár, wherever *P. longifolia* is known by the name *salla*; *chíla* and *karchilla* in Garhwál; *kail* and *chíl* in Jaunsár; *dol chilla* in Kumaun; *ráisalla* in Central Kumaun; *lím* in Byáns; *lamshing* amongst the Bhotiyas of Dárma. Madden, Jour. Agri.-Hort. Soc., Cal., VII., 80: Brandis, 510: Cooke, 824.

This pine occurs in Upper Garhwál, on Rikholi Gudari (a spur from Trisúl), about Kanol near Rámni, and on Tungnáth; along the Dhauli to the Níti pass and in Byáns and generally only on spurs issuing directly from the snowy range. It seems to be absent in Central and North-Western Kumaun, but occurs near Dhákuri. The limits between which it flourishes in this portion of the Himálaya have been estimated at from 5,000 to 12,000 feet. The forest survey of 1865-66 gives the total area under this tree at 2,100 acres in Kumaun and 14,042 acres in Garhwál. The following are the principal localities, with the size of the forest and the number and class of each tree per acre:—

Locality.	Acres.	*Trees.*			
		1st.	2nd.	3rd.	4th.
Kanol Shatúl on the banks of the Nandákini ...	782	1	3	4	4
Above Sirka near Titalakot on the Káli ...	100	1	1	2	4
On the Vishnuganga near Pandukeswar ...	1,290	0	2	3	4
On the left bank and between it and the eastern Dhauli.	3,500	1	3	4	5
On the left bank of the Dhaulí	3,000	5	5	6	6
On the left bank of the Rishiganga and near Tapuban,	5,050	2	4	5	5
Along the Kúnti river in Dárma	700	0	4	6	10
On its lower course	1,400	1	6	10	10

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[1] This name seems a misnomer, for though specimens occur up to 150 feet, it is not distinguished by its height from the other pines and is more of a silver-fir.

The Vishnuganga forests are inaccessible except near Pándukeswar, and those along the Rishiganga, Dhauli, and Kúnti rivers are practically excluded from the market by their distance from the plains and the difficulties of transport. There are considerable forests of this pine near Datmer on the Tons and on the right bank of the Rupin, and generally throughout the cedar tracts and above them it occurs in quantity. The grain of the wood is close and soft in working. The sapwood is whitish and the heart-wood light-brown and streaked with red. It is in some demand for house-building, though ranking below the cypress for durability. It does not stand exposure to excessive moisture. In the form of planks it is said to warp badly when exposed to the sun, and to become affected by dry-rot if placed in contact with damp earth. The highly resinous, small, knotty branches are used for torches, and the charcoal of the entire tree for smelting iron. The tree grows to a great size, the average girth of the larger trees being 13 feet. The rings average fifteen to the inch and the weight of a cubic foot is about 25℔, with a specific gravity of ·686. A piece of this timber of average quality, 22 inches long and one inch square, broke with a pressure of 368℔.

Cedrus Deodara, Loudon; *Pinus Deodara*, Roxb—Himálayan cedar—the *deodár*, *diyár* of Kumaun and Garhwál; the *kelon*, *kelu* of Western Garhwál and Jaunsár, where the name *deodár* is given to the *Cupressus torulosa*: *deva-dáru* (divine tree), Sansk. Madden, Jour. Agri.-Hort. Soc., Cal., VII.: Brandis, 516: Cooke, 128: Roxb., 677.

There are no natural groves of *deodár* in Kumaun and only one large forest in Garhwál. There are numerous plantations around temples in Kumaun, aggregating about 800 acres. Amongst them may be mentioned those at Lodh, Bála-Jagesar, Pharka, and the groups at Súi, Rikhesar, Mankesar, Kalsia, Simalti and Ghatot near Lohughát, and Kshetrapál near Somesar. Along the western Dhauli between Kák and Malári there is a natural forest having an area of about 1,500 acres and giving one second-class, three third-class and eight fourth-class trees to the acre. At Lata on the Rishiganga there are about 70 acres of fine, healthy trees, one giving a girth of 30 feet, and at Parbati, near the Nandákini and Shatúl, there are some fine groves. The average girth of the largest trees in these provinces appears to be about 15-20 feet. Major Garstin measured some near Malári over 20 feet in girth at six feet from the ground. The cedar yields an oleo-resin similar to that of the *chír;* the oil is used in medicine and the twigs and branches are also said to possess medicinal properties. The great cedar forests of these provinces occur along the Bhágirathi valley and in Jaunsár-Báwar, and these are fully noticed in the accounts of those forests given hereafter. Dr. Brandis writes:—

"The *deodár* for the first three or four years of its life grows slowly, attaining 12-20 inches in height with spreading roots that do not go deep down. In this shrubby and stunted state the young plant can maintain its existence under the shade of other trees for considerable number of years without making much progress: but when light overhead is given, then a leader is at once formed which shoots up rapidly. At a more advanced age, the rate of growth of the *deodár* is determined without difficulty by counting the annual rings." The existing records show that the growth is influenced very much by the climate. In the dry valley of the Bhágirathi the rate of growth is much slower than in Jaunsár, where there is a heavy rainfall, so that in the former tract a tree takes 86 years to increase from 4′6″ to 6 feet, whilst in Jaunsár this is accomplished in 23 years. Within each tract also the rate of growth differs considerably. Colonel Pearson noticed in the Bhágirathi valley a stump 6′9″ in diameter with only 305 rings, and in another part of the same valley a tree with a diameter of only 4 feet showed 480 rings and two having a diameter of only 18 inches had 145 and 147 rings respectively. The wood in these slow-growing tracts usually has a closer grain and a deeper colour than the timber grown on southern aspects and in a moister climate. The soil too in these tracts is generally poor and is formed from the decomposition of granite, gneiss, and clay slate, and in the rapid-growing tracts the soil is richer and deeper. Isolated trees, such as those at Wán, often attain a great size. Dr. Stewart measured one at Kuársi in the Ravi basin, at an elevation of 7,500 feet above the level of the sea, 44′2″ in girth at two feet from the ground and 36′4″ in girth at six feet. Dr. Brandis records that one was measured at Parbani in Kunáor 34′4″, and that the girth attained by the largest trees there is 30-36″. Madden measured one between

Nachár and Turanda in lower Kunáor (in 1830) having a girth of 36⅞ feet at five feet from the ground. The tallest *deodár* measured by him was in the Nachár forest on the Satlaj, 250 feet high, 20 feet in girth at the base, and more than 550 years old, and there was a considerable number of trees in the same forests more than 200 feet high. Moorcroft measured a fallen tree on the Tugási hill in the Dhauli valley and found it 159 feet: another was 180 feet in height.

Many experiments have been made to ascertain the transverse strength of *deodár* taken from the Panjáb, the Garhwál, and the Kumaun forests. The weight of a cubic foot appears to vary from 25 to 40℔., but in Garhwál approaches more the latter; in one series giving an average of 37℔. A well, seasoned piece, 22 inches long and one inch square-broke at 345℔. It had a specific gravity of ·655 and showed eight rings to the inch. The result of eight experiments on Garhwál timber made at Rúrki (390-798) gave an average of 592. The result of a series of experiments at Almora in October, 1844, conducted by Captain W. Jones, ten with timber cut in the preceding month and ten with seasoned timber, is shown in the following table. In the first ten experiments the distance between the supports was four feet and the pieces were two inches square: in the second ten the distance between the supports was increased to eight feet and the pieces were 2½ × 3″ :—

Specific gravity.	Weight producing deflection of	Breaking weight.	Remarks.
	½ inch ℔.	℔.	
·608	1,036	1,588	Good straight grained wood.
·710	1,024	1,636	Lower side split a little at 1,060.
·698	736	880	Not straight-grained and slightly flawed.
·669	1,060	1,540	Lower side split at 1,308.
·690	904	1,456	Ditto 904.
·585	680	976	Broke suddenly.
·574	680	708	Ditto.
·614	344	...	Ditto No flaw perceptible.
·586	568	1,204	Ditto.
·604	624	...	Lower side went at 624; uneven grained

Specific gravity.	Weight producing deflection of		Breaking weight.	Remarks.
	1 inch.	2 inches	℔.	
·641	350	764	820	Snapped suddenly : light-coloured ; said to be outside of tree.
·618	400	788	1,028	Heart of tree red and oleaginous.
·644	344	660	908	Snapped short suddenly ; light-coloured.
·579	428	876	1,116	Heart of tree very good and red.
·578	344	736	964	Snapped suddenly, but was in appearance the best piece of all five.
·566	344	680	750	Good sound wood, but knotty, coarse and wavy in grain ; snapped suddenly at knot.
·629	344	576	624	
·619	512	960	1,188	Dark cedar-coloured, fine grained ; broke at knot.
·630	598	1,080	1,700	Dark cedar-coloured ; under-side very fine straight grained and light-coloured.
·603	484	876	1,092	Dark cedar-coloured, but rather coarse in grain

The timber of the *deodár* is the most highly prized of all the conifers for house-building, granaries, chests, boat-building, and railway sleepers. It appears to be little affected by extremes of heat, cold or moisture and is easily worked. In a climate like that of Kashmír it appears to be almost imperishable. Moorcroft states that the pillars of the great mosque erected by Aurangzeb at Srinagar showed no vestige of decay from exposure or insects at the time of his visit, and that pieces of *deodár* from the Zain-ul-kadal bridge were found little decayed, although exposed to the action of water for four hundred years. Many of the other bridges still standing in Srinagar may perhaps claim a greater antiquity. Gerard records some timber in a house in Basáhir as being 200 years old and as sound as the day it was cut. The cedar is a sacred tree in the hills and is in much demand for the temples, for the doors, walls, and roofs. Madden notes that he saw some beams in a Kunáor temple that were said to be 600 to 800 years old and showed no signs of decay, and though this may be an exaggeration of his informants, it indicates the popular belief. Boats built of *deodár* and lined with *chír* last from thirty to forty years, and for railway sleepers no other wood can compete with it. White-ants eat the sap-wood and but rarely attack the heart-wood, and neither the sap-wood nor the heart-wood is liable to dry-rot. Immense numbers of sleepers of this wood have been supplied from the

Bhágirathi and Jaunsár forests during the last fifteen years. The Jaunsár forests on the Deoban ridge between the Jumna and the tons were estimated by Colonel Pearson in May, 1869, to contain 34,000 available first-class trees and the Bhágirathi forests (excluding the Bhilang valley) 116,700 first-class trees. If to these are added the probable contents of the valleys of the Tons and Jumna rivers, the total number of first-class trees available in 1868-69 was about 500,000. The proportion of smaller trees may be gathered from the following estimate of those in the Bhágirathi valley :—

First-class or above 6′ in girth ...	116,700
Second-class or 4′6″-6′	53,660
Third-class or 1′6″-4′6″	127,536
Fourth-class, below 1′6″	213,281

Since 1868-69, however, there has been a great diminution of first-class trees to supply the numerous requisitions for railway-sleepers and public works.

Abies Smithiana, Forbes ; *A. Khutrow*, Loudon; *A. spinulosa*, Griffith ; *Pinus Smithiana*, Wallich ; *P. Khutrow*, Royle ; *Picea Morinda*, Link.—the Himalayan spruce ; Smith's spruce—the *morinda* and *rái* of Jaunsár ; *kandre, re, rhái, ráo, kudrau, rái ála, rágha, kail, káluchilu* and *kiu* of Garhwál. Madden, Jour. Agri-Hort. Soc., VII., 87 : Powell, I., 564 : Cleghorn's analytical key to the Conifers : Brandis, 525 : Cooke, 127.

Smith's spruce, according to the survey, is found in the north of Garhwál near Joshimath and in the Dhauli and Vishnuganga valleys. The forest survey of 1865-66 estimated the area under this tree in Garhwál at 26,908 acres. The following are the principal localities, with the size of the forest and the number of each class of tree per acre :—

Locality.	Acres.	*Trees.*			
		1st.	2nd.	3rd.	4th.
Near Kanol, Peri and Shatúl on the upper Nandákini	6,328	2	3	4	4
On the slopes of Tamba Deo near the western Dhauli	50	1	3	3	3
Near Golábkoti on the left bank of the western Dhauli	2,050	5	5	5	7
On the Biriganga and Rishiganga ...	13,000	5	4	5	7
Further up the Rishiganga	4,980	2	4	6	8

Dr. Griffith describes this spruce as growing abundantly on the northern ranges of Bhután, 7,800-11,600 above the level of the sea, preferring northern aspects and occurring in masses below *A. Webbiana*. It is rare in Sikkim and confined to valleys of the inner range at 8,000 to 9,000 feet mixed with *A. dumosa* and seldom exceeding 50 feet in height. It has not been found in Kumaun, and Madden states that he was unable to detect a trace of it in Dánpur, Juhár, or along the snowy slopes of Nanda Devi and Nanda Kot. Nor were Bhotiyas of Milam, accustomed to traverse the mountains, able to recognise the cones or dried specimens. It is not mentioned in Webber's survey as occurring in Kumaun, but is said to be indigenous on Rikholi Gudari and occurs, as we have seen, in the valleys of the Nandákini and western Dhauli. On the left bank of the Bhágirathi above Jhala it is found with cedar, silver fir, and birch on the slopes having a northern aspect. It occurs also in the forests of the upper Jumna and Tons and in Jaunsár.

The spruce grows to an immense size. Webber mentions one on the Nandákini 18 feet in girth and 110 feet in height. Hodgson records the length of a fallen tree as 169 feet, and Madden gives the girth of ten trees as varying from 13½ to 20 feet and showing an average girth of 16 feet. Dr. Stewart has recorded one of 21 feet, but the average girth is from 8-12 feet with a height of 100-150 feet. As has been noticed, the spruce prefers a northern aspect, and this is but one of many instances of the phenomenon which strikes every traveller in the Himálaya, that of the northern and north-western aspects being densely wooded, whilst the south and south-eastern are wholly or almost bare. Baron Hügel, as quoted by Madden, thus refers to the valley of Perhamgala in the Pír Panjal range :—"Strange to say the south side (aspect) of the valley is everywhere wild and dreary; while fine trees grow up to the very summit of the mountain on the north face. The reason may possibly be found in the fact that on the south side the repeated action of alternate freezing and thawing destroys every kind of vegetation except a few grasses." The wood is white ; the outer part turns red and decays rapidly if exposed to moisture, so that it is seldom used except for indoor work. A very dry piece 22 inches long by one inch square broke at 288lb., being the weakest in a series of experiments of all the conifers. The specific gravity was only 426, though the piece in question averaged 14 rings to the inch. The bark is used for roofing purposes and to make rough water-troughs for cattle, and the young cones form a part of the drug sold as *gaj-pipal* in the bazars.

Abies dumosa, Loudon ; *Pinus dumosa*, Don ; *P. Brunoniana*, Wallich—Hemlock spruce of Nepál—the *tungsing* of the Bhotiyas of Dárma in Kumaun ; *changathasi dhúp* of Nepál. Madden, Journ. Agri.-Hort. Soc., VII., 95 : Brandis, 527.

The forest survey in 1865-66 gives the total area in Kumaun under this tree at 3,650 acres. The principal localities, with the size of the forest and the number of trees per acre according to class, are as follows :—

Locality.	Acres.	*Trees.*			
		1st.	2nd.	3rd.	4th.
Dola Kot and Kála Mundi, to the west of the Gori river, mixed with *Abies Webbiana*.	140	1	2	2	4
In Chaudáns and Byáns, to the north-west of the Dhauli.	650	2	6	5	5
Manktil dánda and in the valley of the Chirkila gár, falling into the Dhauli.	1,160	1	2	3	3
At Titala Kot near the Káli	600	2	3	3	4
Spurs of Panch Chúla above Túnik ...	920	2	4	6	6
In Byáns near the Káli	1,000	2	4	4	10

It was first discovered by Captain Webb in 1810 and again by Mr. Webber in 1863. Dr. Hooker found it in Sikkim in narrow gorges on the southern flank of Kanchinjinga at an elevation of between 9,000 and 10,000 feet. In the innermost valleys the limits are 8,500 and 10,500. The Gorkháli name there is '*thingiya*' or '*tingúri-salla*,' and the Bhotiya name is '*semadúng*.' One specimen measured 27 feet in girth at five feet from the ground. Griffith found it in Bhután at 6,500-9,700 feet above the level of the sea, and it is said to be indigenous on Gosáinthán and Banepa. In Kumaun, it occurs in Dárma and about the Chipula range at 9,000-11,000 feet, and here it is called '*tungsing*' and attains a height of 80-100 feet, with an average girth of 10-12 feet. The timber is white, fine-grained and light, having a specific gravity of ·612, but is said to warp much from exposure. The bark is used for thatching purposes.

Abies Webbiana, Lindley ; *A. Pindrow,* Royle ; *A. densa,* Griffith ; *Picea Webbiana,* Loudon and Wallich ; *Pinus spectabilis,* Lambert—Himálayan silver-fir.

Madden separates the variety known as *Picea Pindrow*, Royle, from *A. Webbiana*, Wallich., though the names of both are the same in the vernacular ; *rágha* and *ráo rágha* in Kumaun ; *wúman* amongst the Bhotiyas of Dárma ; *bang, dodhma rágha, teliya* or *chíli rágha* in South-eastern Garhwál ; *chílrao* in Central Garhwál ; *morinda* in North-western Garhwál and Jaunsár ; *raunsla* or *rái salla* about the sources of the Kosi in parganahs Bárahmandal and Dánpur and on the Dúdú-ki-toli range near Lohba in Garhwál. Madden, Jour. Agri.-Hort. Soc., Cal., VII., 96 : Brandis, 528.

Madden thus describes his *Picea Pindrow* of Royle :—

"It flowers in April and May, when the young shoots are of the brightest green, the old leaves being nearly black. The trunk is branched nearly to the ground, but cones are produced only on its loftiest boughs. By the middle of May the cones are about 3 inches long by one in diameter and more or less cylindrical. As the season advances, they become more or less completely so, and of a rich dark purple colour. They ripen in October and November. The cones of *P. Webbiana* are less cylindrical, thicker and shorter, and the bracteoles more rounded, scarcely emarginate, and with a thicker and longer apex. The spiral arrangement of the scales seems identical, and each has the same copious supply of white resin. The cones of *P. Pindrow* are perfectly cylindrical ; the scales more prominently eared ; bracteoles oval, obtuse, eroded, emarginate, the mucro of the same length as the border of the sinus."

Localities.

This variety forms dense forests on all the great spurs towards the heads of the Pindar, Sarju, eastern Rámganga and Káli rivers : near the sources of the Kosi at Bhatkot and on the Dúdú-ki-toli range, near the sources of the western Rámganga.

The other variety is thus described as the *Picea Webbiana* of Wallich. :—

"Tree tall, very narrow and like the cypress. Branches short, thick, scrubby, and declining at the extremities. Foliage very dark green ; near its upper limit of a grayer colour. Bark somewhat smooth, tessellated by shallow furrows into small squares; young branches silvery. Leaves three-quarters of an inch to two inches long, flat with three small points, in two rows on either side of branches and twigs. Cone erect, rather short, cylindrical, dark purple, scales broad, dark-coloured near edge, deciduous. Ripe in October. The tree flowers in May, when the strobili are of a purplish red. Remarkable for its upright columnar appearance."

Localities.

It occurs at Rámni on one of the spurs of the Trisúl, between the Pindar and Alaknanda up to the glaciers, and on the summit of Dúdú-ki-toli. The forest survey, 1865-66, gave an estimated area for Kumaun of 13,110 acres, and for Garhwál of 53,280 acres. The principal localities, with the number of each class[1] of tree per acre, are as follows :—

Locality.	Acres.	*Trees.*			
		1st.	2nd.	3rd.	4th.
On the left bank of the Nandákini in Garhwál, at Chati Bukiyál and Gúdari Bukiyál.	790	1	1	7	6
At Shík, Kanol and Shatúl, near the same river	5,600	2	3	3	3
Above Kimoli in the Pindar valley ...	1,040	2	6	7	12
On the Kailganga and above the Pindar ...	1,230	1	6	8	9
On the Pindar from Gumra Páni to Chuding,	3,680	1	4	4	7
Between the Pindar and Sarju and east of the Rámganga.	1,890	2	2	3	8
About Munsyári	670	2	2	4	5
In Dárma, Chandáns, and Byáns	2,900	2	4	6	8
On the spurs of Tungnáth, and in the valleys of the Nigholi and Balsukhi rivers.	4,370	2	4	4	5
To the left bank of the Alaknanda, on the Pilkánta and Ramari ranges	6,070	4	4	6	8
On the left bank of the western Dhauli ...	15,100	5	5	..	8
On the upper Nyár	3,200	2	6	8	10
Dúdú-ki-toli range	8,800	2	6	8	10
On the spurs of Panch Chúla	3,910	5	5	7	8
Deo Thal in Agar Patti, Kumaun ..	3,200	1	2	4	4

The forests on the Pindar could easily be worked, and that river can carry the largest logs with ease. Those on the Balsúkhi and on the Mandákini, near Kedarnáth, are too high up to be accessible. In the Bhágirathi valley, above Jhola, it occurs with cedar, spruce and birch, and in the upper valleys of the Jumna and Tons and their tributaries is abundant, associated with oaks. It is also found throughout Jaunsár along the ridges of the main range and of the lateral spurs and on Surkhanda near Masúri at an elevation of 8,200 feet. It occurs on the Dúdú-ki-toli range in Central Garhwál at 7,500-10,000 feet and on Tungnáth up to 11,200 feet. Brandis notes the limits in Jaunsár, Garhwál, and Kumaun to be 7,500-13,000 feet; it nearly reaches the latter elevation in the Munsyári district and in the Nandák valley ceases at 12,000 feet. Griffith states that it forms vast forests at 12,000 feet in Bhután, below the belt of rhododendrons, and in Sikkim, under the Gorkháli name '*gobriya-salla*' and the Bhotiya name '*dúngshing*,' it occurs abundantly in the zone 9,700-11,500 feet. The limits in the southerns flanks of Kanchinjinga and crests of the inner sub-Himálaya are 10,000-12,000 feet, but in the inner valleys and rearward ranges 9,000-13,000 feet. In the north-west Himálaya, it thrives best in cold damp glens with a north or west aspect, and in such places, according to Brandis, constitutes alone or associated with the Alpine birch the upper forest belt. The silver-fir attains a height of 120-150 feet and an average girth of 9-15 feet, though specimens exceeding 20 feet in girth have been noticed. The wood is white, soft, rather coarse-grained and inodorous and is not much esteemed. It is not durable when exposed to moisture or the sun and is chiefly used for indoor work, though in dry climates where better wood is not obtainable it is split up and used for shingles. A piece 22 inches long and one inch square broke with a weight of 379lb. The specific gravity of this piece was ·491 and it showed 16 rings to the inch. The following table shows the results of some experiments on the transverse strength of the silver-fir made by Captain W. Jones at Almora in 1844. The distance between the supports in the first five experiments was four feet and the pieces used were two inches square. The distance in the last five experiments was increased to eight feet and the pieces used were 2½ inches in depth by 3 inches in breadth :—

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[1] Classes as in *chír*; first, 8 feet in girth and upwards; second, 5 to 8; third, 2 to 5; and fourth, under 2 feet.

Specific gravity.	Weight producing deflection of	Breaking weight.	Remarks.
	½ inch.	lb.	
·472	680	940	Broke at a knot one foot from the centre.
·559	512	880	Broke suddenly; no flaws perceptible; deflection ⅞ths.
·546	820	1,208	
·518	820	1,084	
·560	736	904	

Specific gravity.	Weight producing deflection of		Breaking weight	Remarks.
	1 inch.	2 inches.	lb	
·436	344	652	780	Broke gradually; all very moist and soft.
·481	514	944	1,064	
·434	372	740	788	Broken at a knot.
·458	456	848	930	
·483	400	764	968	

Cupressus torulosa, Don—Himálayan cypress—*Súrái*, *surái*, Kumaun and Garhwál; *rái salla*, Naini Tál; *leauri* of Jaunsár; to the west and towards Simla it is called *deodár;* and the name *súrái* is given to *Juniperus excelsa*. Madden, *l.c.:* Brandis, 533.

Found in Chaudáns, Naini Tál, and of remarkable size near Rámni and Wán on the Kailganga in Garhwál, and from Joshimath to Níti. The forest survey of 1864-65 estimates 1,200 acres of cypress in Kumaun and 4,938 acres in Garhwál. The principal localities, with the number of trees in each, are as follows:—

Locality.	Acres.	*Trees.*			
		1st.	2nd.	3rd	4th.
Right bank of the Nandákini near Rámni,	17	1	3	6	10
Gúni, Búra, Barkuna, Shik, Ali Bukiyal and Wán, near the source of the Kailganga.	601	3	3	6	6
On the Kailganga and at Ketha and Melkhet, on the Pindar and higher up.	378	3	4	5	4
Near Pándukeswar on the Vishnuganga, a difficult river.	150	...	2	3	4
On the left bank and near the slopes of Tamba Deo.	1,790	1	2	3	4
In the valley of the western Dhauli, from Samaughata to Malári.	1,585	1	2	4	5
Near Turag Tál	100	2	2	4	4
Naini Tál	160	2	4	6	6

In north-eastern Kumaun, it occurs along the Kálimundi range, separating the Rámganga from the Gori, but is apparently wanting in north-western Kumaun. The older trees in a favourable climate grow up in a slender column like the *A. Webbiana*, and, except that the foliage is a yellowish green, considerably resemble it in its sombre colour and columnar appearance. The thick contorted boughs also give it a rough appearance. At Naini Tál the boughs with a southern aspect are fuller and more regular, giving the tree a lop-sided appearance. The cypress occurs also in the Bhágirathi valley and along the head-waters of the Jumna and the Tons, and in Jaunsár-Báwar on the Lohkandi and Moila hills and below the Karama peak. In Munsyári it occurs at 7,000-9,000 feet; in Naini Tál at 6,500-8,000 feet and in the valley of the western Dhauli it abounds from 7,000-8,000 feet: "after leaving the oaks, elms, hornbeams, &c., the wood becomes entirely cypress, and from summit to base of the mountains no other tree is seen. The larger trees not unfrequently attain an enormous size, some of them having a girth of 27 feet." Major Garstin measured one at Wán over 38 feet in girth and several were over 20 feet. Madden writes:—"The famous cypress grove at Ming, four or five miles south-east of Joshimath, stands on the north-east aspect of the mountain at 7,500 feet elevation, surrounding the temple of Chandika Devi. Most of the trees are 12-16 feet round: but there is one 27 feet, measured flush with the ground on one side, 10 or 12 feet above it on the other: it is branched nearly to the base with enormous root-bole embracing rocks and is probably not under a thousand years old." The cypress has an average height of 60-120 feet and an average girth of 6-12 feet. These measurements vary much with the position and elevation. Above Malári, in the Níti valley, it is so dwarfed as to appear a mere bush, and its limits as a tree in Garhwál may be set down at 4,500-9,000 feet, but when introduced, it flourishes considerably lower, as at Háwalbágh (4,000 feet) and Diwángiri (2,000 feet). The wood is hard, tough, long-fibred and of a reddish colour, and was formerly extensively used for house-building in Naini Tál. Throughout Kumaun the timber is freely used for indoor work, and there is apparently no religious consideration prohibiting its use, but to the west of the Tons it assumes the name *deodár* and is solely used for incense. The timber when used is considered very durable, but too flexible for any position where great weights have to be sustained, and for this purpose oak is preferred. A piece 22 inches long and one inch square broke at 432℔., it had a specific gravity of ·695 and showed 18 rings to the inch. *C. sempervirens*, Linn., is occasionally cultivated in gardens in Kumaun at low elevations.

Juniperus communis, Linn. Varieties *alpina, nana;* ground cypress ; *padma* and *parpinja* of Níti ; *churpunja* of the Mána valley ; *lhála* of Byáns, but H. Strachey names the *lhála* of Byáns *J. religiosa* ; the *chíchiya* of Milam. Madden, Journ. Agri.-Hort. Soc., Cal., VII., 153-5 : Brandis, 535.

It is found on Chítu Bináyak (10,500 feet) ; at Milam and Tola (11,000-12,000 feet), Bampa, Malári (10,500 feet); Jelam (9,000 feet), and Rimkim (14,000 feet), on the glacier-moraines of the Vishnuganga, west of Mána and in Kunáor. It is said to be used as one of the sources of incense and rarely attains a height of more than 7-8 feet with a stem 18-24 inches. It is used for fuel in Juhár. The aromatic berries are added to spirits distilled from barley and are also exported to the plains under the names *abhúl, ahúber*, and are used in medicine as a stimulant and diuretic.

Juniperus recurva, Ham.—Weeping blue juniper ; the *better, bhedara, jhora, gúgal, aru* and *agaru* of Kumaun and Garhwál ; the *bil* of Milam ; *padbank* and *páma* of Byáns. Brandis, 536. There are two varieties : one with acute spreading leaves, found at 12,000 to 13,000 feet ; the other with imbricated cupressiform leaves and extending to nearly 15,000 feet. It flowers May-August and the fruit ripens July-November.

Localities.

It occurs beyond Milam and Níti (to 15,000 feet) ; in the valleys of the Dhauli (lower limit, 9,000 feet), Vishnuganga and Kedárganga, at Pindari and most other glaciers. Hodgson found it on the Bhágirathi at 12,914 feet, and describes it as having there the form of a large creeper, not a tree ; some of the branches were 6 inches in diameter and of a considerable length ; in some places they were above the spongy soil and in others below the surface. The wood is of a red colour, has a brittle and soft grain and the characteristic odour of the pencil cedar. It is one of the sources of incense and is apparently the *thalu, thelu* or *telu* of Basáhir. It is used in the manufacture of the yeast called *balma,* which forms an adjunct in the preparation of spirits from rice. The yeast is made by moistening coarse barley flour, which is formed into a ball and covered all round with the leaves and twigs of juniper. The whole is then closely wrapped up in blankets kept in a warm place and allowed to ferment, which usually takes place in three or four days.

Juniperus excelsa, M. Bieb.—Himálayan pencil cedar—*Shurbuta, shúrgu, shúkpa* of Tibet ; *dhúp, padmak, súrgi* of N.-W. P. ; *padmak* of Milam. Madden, Journ. Agri.-Hort. Soc., Cal., VII., 138-146 : Brandis, 538.

This is another of the sources of Tibetan incense. It occurs at the upper limits of *A. Webbiana* (8,900-11,500 feet) beyond Milam ; at Jelam on the Dhauli (9,000 feet) and in the valley of the Girti. In Nepál it grows to a height of 60 to 80 feet, and is there a fine large tree with dense branches of a dark colour and close foliage. In Sikkim it falls to from 15 to 20 feet. Hooker notes that the Sikkim tree has a scaly bark ; the heart-wood is red and odorous, and the leaves are quadrifariously imbricated, and the wood is burned as incense. The juniper is often confounded with the cypress ; the former, though the ultimate ramifications are very numerous, has them much shorter and less pendulous than the cypress, and the green is more brilliant. The leaves are closely imbricated in decussate pairs, somewhat obtuse, with a central gland or raised line on the back ; four-ranked and imbricate ; or slender, acute, disposed in threes and spreading. The fruit ripens in September-October, of a purplish blue colour, the size of a small pea, one or two-seeded, with a strong aroma when bruised. The tree does not usually attain any great height, seldom being more than 15-30 feet, with a disproportionately thick stem 2-5 feet at six feet from the ground and often 6-8 feet and in some cases much more. One at Súngnam girthed 13 feet at 5-6 feet from the ground, and Brandis mentions another in Lahúl with a girth of 33½ feet and only about the same height. The pencil-cedar occurs also in the valley of the Jádh-ganga at over 11,000 feet, and was first found there by Captain Herbert. Some logs of this valuable wood have been removed and exported by the Bhágirathi river to the plains, but in the hills it is only used for fuel or incense.

Taxus baccata, Linn.; *T. nucifera,* Wall., *T. Wallichiana,* Zucc.—Yew—*Thaner,* Kumaun ; *lúet,* Sor ; *nhare,* Byáns. Mudden, Journ. Agri.-Hort. Soc., Cal, VII., 155 : Brandis, 537.

The yew is found at Búla Jagesar, 5,900 feet ; Púya-páni, on the road to Deo Dúra, 6,500 feet ; on Thákil in Sor ; Kanol on the Nandákini ; Chúla in Chaudáns ; Laduli ghát on the Nayár

(7,000 feet) and near Tungnáth, but is indigenous only on the spurs from the snowy range. It occurs with box and cypress in the Bhágirathi valley between Bhatwári and Jhola and along the head-waters of the Tons and Jumna. Griffith notes its occurrence in Bhután between 7,100 and 9,800 feet, and 8,000-9,000 feet would seem to be the limit within which it flourishes there. On the outer ranges in Sikkim it does not descend below 9,000 feet, but on the inner ranges it is found as low as 7,000 feet, and in Basáhir Madden has not seen it below 8,000 feet. In Garhwál poor scrubby specimens ascend as high as 11,200 feet at Kedárnáth and to 11,000 feet on Tungnáth. Hoffmeister records a tree near Gangotri, 15 feet in girth, and Dr. Hooker notes one of 18 feet in girth on Tonglo in Sikkim; but the average girth is not more than 5-8 feet and height 20-30 feet. The sap-wood is whitish, but the heart-wood is heavy, close-grained, and eminently fitted for turnery, taking a very high polish. The tree is held in high veneration and the wood is burned as incense and the branches are carried about in processions in Kumaun. The people of Ladák import yew-bark from Kashmír and use the inner part dried and prepared as tea or for mixing with tea and as a dye. The tree is there called *sungcha* and the bark *chatúng*. The leaves (*birmi*) are exported to the plains and are used in medicine and the berries are eaten by the poorer classes. There is little export of the timber, which would seem to be well adapted for shafts and the purposes to which its European representative is applied, if it could be procured in sufficient lengths.

CHAPTER X.

ECONOMIC BOTANY—(*continued*).

CONTENTS.

Forest history. Grazing tax. Boundary disputes. Government forests. Kumaun forest-division. Naini Tál forest-division. Ránikhet forest-division. Garhwál forest-division. Dehra Dún forest-division. Ganges (Bhágirathi) division. Forest at the head of the Tons and the Jumna. Jaunsár forest-division. Rheea cultivation. Cinchona. Tallow-tree. Ipecacuanha. Cork-oak. Sweet-chestnut. Carob. Mezquit and others. Tea.

Forest history.

From time immemorial, the forests along the foot of the hills to which alone any fiscal value pertained as well as those within the hills were considered the property of the ruling power and as such invariably formed a source of revenue to the State. The most simple mode of realising this revenue was that actually adopted by subjecting the products of the forests to a small proprietary due in the shape of duties payable by the exporters. The products consumed within the hills by the people themselves were, as a rule, too inconsiderable to be taken into account and where exceptionally large, as in the case of fuel for smelting ores, were included in the revenue demand. These duties on ordinary forest produce were collected at stations along the foot of the hills, whilst the duty on catechu was fixed at so much per kiln and was paid by the manufacturers. For the first three years of our rule the forest dues were leased with the transit duties on merchandise, and on the abolition of the latter source of revenue, Mr. Traill was authorised to farm out the forest dues or *káth-báns* and *kath* mahâls as they were called from their principal items *káth* (timber), *báns* (bamboos) and *kath* (catechu), to the zamindárs of the parganahs in which they were collected.[1] The revenue from this source in 1818-19 for Káli Kumaun, Chaubhainsi, Chhakháta, Kota, the Pátli Dún and Udepur amounted to Rs. 3,200, as compared with Rs. 2,841 in the previous year. The following table shows the collections in sonat rupees for nine years under the new system :—

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[1] **From Commissioner, 14th September, 1818. To Commissioner, 25th September, 1818.**

Year.		Rs.	Rs.
1818-19 ...	Kumaun ...	2,644	
	Garhwál ...	566	3,200
1819-20 ...	Kumaun ...	3,327	
	Garhwál ...	662	3,989
1820-21 ...	Kumaun ...	4,038	
	Garhwál ...	812	4,850
1821-22 ...	Kumaun ...	4,579	
	Garhwál ...	924	5,503
1822-23 ...	Kumaun ...	5,368	
	Garhwál ...	934	6,302
1823-24 ...	Kumaun ...	5,733	
	Garhwál ...	1,368	7,101
1826-27 ...	Kumaun ..	2,266	
	Garhwál ...	1,100	3,366
1827-28 ...	Kumaun ...	2,294	
	Garhwál ...	1,381	3,675
1828-29 ...	Kumaun ...	2,620	
	Garhwál ..	1,405	4,025

In 1824, the collection of these dues was intrusted to the authorities of the Muradábád and Bareilly districts in consequence of the difficulties regarding boundaries that had occurred, but in 1826 the duty of collecting them was restored to the hill-districts. In 1828, the forest dues were leased to the farmers of the *charái* or grazing-tax at the same rate, as it was found that the two could not be then usefully separated.

Grazing-tax.

This grazing-tax was one of the many miscellaneous items of revenue that descended to the British from former Governments. From the earliest times, the landholders in the hills were all subject to a tax on their cattle known as *ghikhar* which with other cesses was abolished at the first settlement.[1] The practice of collecting these dues, whether for the Government or for the landholders, extended to the Bhábar and Tarái and was continued there under the name *gái-charái;* but the cattle of the hill-men were exempt from this tax, which was levied chiefly on the cattle of the villages in the plains that came into the forests during the hot season. During the two or three years succeeding the conquest the number of cattle proceeding from the hills to the Bhábar and Tarái was not so great as to render any cess on them an object of interest to the Government, but the security afforded by the abolition of the old rural guard (*chaukidári*) system and the introduction of an efficient police led to increased resort to the plains. It was therefore resolved in 1822 to subject all cattle sent to graze in the Bhábar and Tarái to a uniform tax of three annas for each female buffalo, two annas for each cow, and one anna for each bullock a year. The farm of this tax for the year 1822-23 was given out in three leases, aggregating Rs 2,077 per annum. The unsettled state of the boundaries between Kumaun and Rohilkhand became a fertile source of dispute between the farmers of this tax for the hill and plains portions of the submontane tract. Many of the hill-men having made their arrangements with the Rohilkhand farmers paid the duties to them and were again called upon to pay by the hill farmers, who claimed the right to levy these dues in all places in which the *chaukidári* cattle dues had formerly been collected. In 1823, the cattle belonging to the Kamíns, Sayánas, and Thokdárs or head-men of parganahs in the hills and to Padháns or head-men of villages in the Bhábar and those belonging to permanent residents were exempted from these dues. In 1826, the boundary between the hills and Rohilkhand was finally arranged and separate farms for the grazing dues were established. The principle on which the collections were made was that the farmer within whose jurisdiction the cattle-pens were situate was entitled to collect the tax. The dues were very rarely collected per head, the plan being to count in each *goth* or cattle-pen the *agals* or *donas*, that is the wooden bars to which the cattle were tied at night. The customary rate was to consider each *agal* as containing eight buffaloes and eight cows liable to a tax of two rupees.

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[1] To Board, dated 16th July, 1822. These cesses were called *ghikhar, gobar,* and *puchhiya* in the hills and were farmed out as *jagát*, and under the Heris and Mewátis in the Bhábar were called *donia*, from the *donu* or wooden bar to which the cattle were tied at night, and each of which paid one kuchcha ser of ghi and four pice a year.

Boundary disputes.

To make this point in the history of the management of the forests more clear, it will be necessary to refer to these boundary disputes. In the earlier years there were no exports of any value from the portion of the lowland tract lying below the chain of custom posts established to levy the export duty, and it was thought that no difficulty could arise in regard to the collections made there, but the unsettled state of the boundary between the Bhábar and Tarái and the conflicting claims of the landholders of the frontier villages, both of the hills and of the plains, soon led to innumerable complaints in which the district authorities on both sides found themselves partizans. The records show a voluminous correspondence on this subject extending over several years. Early in 1819, Mr. Traill reported on the encroachments made by the zamindárs of Bilhari on the forests lying along the foot of the hills now included in the Tallades Bhábar. This tract was valuable to the hill-men as affording them pasture for their cattle during the winter months when the grass in the hills dried up and became useless for fodder. During the Gorkháli rule a joint commission had been appointed by the Nepál Government and the Nawáb of Oudḥ to settle these disputes, and the Saniha nála was fixed upon as the boundary between the two states. The hillmen had always occupied the jungle to the north of this boundary and were anxious to undertake the cultivation of the portions lying at the foot of the hills which had recently been taken possession of by the Bilhari landholders.[1] It was agreed that an attempt should be made to settle the disputed boundary on the basis of that which existed in 1802, when Rohilkhand was ceded to the British, and that advantage should be taken of this arrangement to demarcate the whole line of boundary between Rudrpur and the Nepál frontier. The difficulty was much enhanced by the claims set up by Major Hearsey, who, in 1814, had purchased the entire taluka of Bilhari at auction for arrears of revenue and now demanded possession of a portion of the Kumaun Bhábar, on the plea that it belonged to the lowland parganah. A commission was appointed to investigate these matters, and it was at length decided that the Saniha nála had always been, and should continue to be, the boundary between the hills and the low country.[2] The collection of all dues was handed over to the plains authorities, but, in 1826, was again intrusted to the Commissioner of Kumaun.

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[1] To Board, dated 5th February, 1819.
From Board, dated 6th February, 1819.
To Collector, Bareilly, dated 1st March, 1819.
From Collector, Bareilly, dated 8th March, 1819.
To Collector, Bareilly, dated 20th March, 1819.
From Collector, Bareilly, dated 26th March, 1819.
To Collector, Bareilly, dated 5th April, 1819.
From Collector, Bareilly, dated 10th April, 1819.
To Collector, Bareilly, dated 5th November, 1819.
From Collector, Bareilly, dated 18th November, 1819.
To Collector, Bareilly, dated 24th November, 1819.
From Collector, Bareilly, dated 1st December, 1819.
To Collector, Bareilly, dated 26th February, 1820.
From Collector, Bareilly, dated 24th February, 1819.

[2] From Board, dated 27th June, 1820.
To Board, dated 19th July, 1820.
From Board, dated 4th August, 1820.

Government forests.

The first notice[1] that I have been able to discover in regard to the reservation of forests for Government use alone occurs in 1826. The whole of the forests had always been recognised as belonging to Government, and any part of them could therefore be appropriated to the exclusive use of Government without the slightest infringement of the rights or claims of a single individual. Mr. Traill recommended the reservation of the *tháplas* or terrace land immediately adjoining the lower range for the timber and bambus required by Government, whilst the extensive forests below it should still remain open to private individuals. A proclamation was issued in 1826, prohibiting the cutting of *sál* within the reserves, which were at once excluded from the lease of forest produce; and thus the system of Government forests commenced. In 1828, as we have seen, the lease was fixed for four years, but in 1831-32 I find the total forest revenue amounted only to Rs. 4,328, of which Rs. 2,923 were realised in Kumaun and in 1832-33 it reached Rs. 4,457, of which Rs. 2,932 were collected in Kumaun. No attempt was made to enforce any system of conservancy and the old system of leasing out the forest dues to contractors continued. In the report on the settlement of Garhwál in 1840, Mr. Batten remarks that large portions of waste lands, including whole ranges and their vast forests, were included from olden time in the boundaries of the adjacent villages, though not in their recorded area. No change in this nominal allotment of waste was then attempted, as such a division was found useful in assigning separate tracts for pasture for the cattle of different villages; but, at the same time, the inhabitants of the villages within whose area these tracts of waste land were nominally included were prohibited from levying any grazing dues unless it had been a custom of immemorial date, and even then the burden of proof rested on those claiming the dues. A similar clause was entered in the lease given to the head-man and in the several agreements signed by the shareholders in the village. Mr. Batten further states that his report[2] should be considered, in a measure, declaratory of the principles on which the settlement was formed, and adds :—"I therefore take this opportunity of asserting that the right of Government to all the forests and waste lands not included in the assessable area of the estates remains wholly unaffected by the inclusion of certain tracts within the boundaries of villages, and no one has a right, merely on account of such inclusion, to demand payment for the use of pasture-grounds or for the permission to cut timber and firewood. Neither does such inclusion interfere necessarily with the right of Government to accept offers for clearance (*naudbad*) leases. But as ordered in the case of the Tarái forests, so in the hills (where, too, claims to proprietary rights are rare), the inhabitants of the villages most adjacent to the tract, or having it recorded within their boundary, should have the first refusal of such leases." In his Kumaun report Mr. Batten distinctly states that these principles apply equally to Kumaun.

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[1] To Board, dated 22nd June, 1826. To Collector, Bareilly, dated 26th September, 1826.
[2] Stat. Kumaun, 125, 336.

In his report on the Kumaun Bhábar in 1846-47 Mr. Batten gives the revenue from the *káth báns* and *chárái* maháls as follows :—

Name of patti.	Forest dues.	Pasturage dues.	Total.
	Rs.	Rs.	Rs.
Kota	4,600	3,801	8,401
Chhakháta	1,451	2,650	4,101
Káli Kumaun	3,705	2,522	6,227
Total ...	9,756	8,973	18,729

He states that though the injury said to be done to the reserved Government forests was somewhat exaggerated in some places, the Government rights had been suspended and in others the older trees had been removed, and recommended that steps should be taken to preserve the few patches of old *sál* that remained and the young *sisu* plantations. In the eastern Bhábar cultivators were allowed to clear the ground and sell the timber. The restriction as to cutting *sál* in the *tháplas* or plateaus of the lower hills which was issued in 1826 had been removed, when Mr. Traill saw the farms falling in one after the other owing to the scarcity of *sál* in the lower sites. In the Kota and Chhakáta Bhábar the farmers were allowed to cut down and sell the *sál* timber which is there confined to the *tháplas* and does not occur also in isolated patches in the plains as it does farther east. In appendix A. will be found a list of rates according to which farmers of the forest dues in Kumaun were authorised to collect from the exporters in 1847, and we shall now proceed to describe the forests as they now exist.

Sub-Himálayan forests.

The sub-Himálayan forests of the Kumaun and Garhwál districts extend from the Ganges to the Sárda, covering the lower spurs and ridges of the Himálaya and running down some distance into the Bhábar. The Tarái forests contain a little *sál*, of inferior growth, barely sufficient for the requirements of the cultivators, and are not included in the tracts under the Forest Department. With the exception of a portion of the Chándni Chauk which belongs to the Tarái, almost all the islands in the Sárda below Kumaun have been given to Nepál. A cart-road running along the foot of the hills from the Ganges to the Sárda generally forms the southern boundary of the forests in Garhwál, but further east several blocks reserved for Government purposes lie to the south of the road and are included in the existing reserved forest area. The western Rámganga and its tributaries, the Barsoti and Kotirao, form the boundary between the two great forest-divisions of Kumaun and Garhwál, whilst the outer Himálaya give a well-defined boundary on the north. Except the Kumaun Iron Company's grant and a number of villages, all of whose rights have been recorded and for whom blocks of forest have been left open, the entire area described forms one vast State forest in one compact block perfectly marked out either by natural or artificial boundaries. Within these limits no private rights exist which can prove injurious to the best *sál* forests, and cattle-grazing is prohibited in all portions which are free of village rights, except where it is entirely harmless. The most valuable timber is *sál*, which grows with great vigour in many parts and covers about one-fourth of the forest area. *Tún* (*Cedrela Toona*) and *sissoo* (*Dalbergia Sissu*) are plentiful in the low, moist valleys and flats, whilst other jungle trees, especially the Terminalias, Lagerstrœmias, Acacias, various species of Anogeissus, Adina, and Ougeinia, are found mixed with *sál* everywhere, even when the last predominates. Amongst the minor forest produce the bambu takes the first rank, and next the matting and cordage materials and indigenous drugs, tans and dyes.

We shall now proceed to give a short account of the existing forest-divisions and their origin. The contract arrangements for felling continued in Kumaun until the year 1858, and as a consequence no

Kumaun forest-division.

system of conservancy could be introduced. The forests of the present Kumaun forest-division[1] were denuded of good trees in all easily accessible places, and were it not that nature has happily made the *sál, sisu, khair, and dhauri* largely reproductive, the new Forest Department would have had little to conserve. Between 1855 and 1857, the demands of the railway authorities induced numerous speculators to enter into contracts for sleepers, and in order to secure a certain favourite area for themselves, these men were allowed, unchecked, to cut down acres of old trees very far in excess of what they could possibly export, so that for some years after the regular forest operations commenced the attention of the department was chiefly directed to cutting up and bringing to the depôt the dead timber left behind by the contractors.[2] Major (now General) Ramsay was the first Conservator. He abolished the contract system in 1858 and gradually introduced a better arrangement, by which the cultivation of patches of land in the forests proper was discouraged and the cultivators were induced to take up lands chiefly south of the cross-road from Hardwár to Barmdeo, leaving the valuable forest land to the north untouched. This the first attempt at real conservancy would, probably, have succeeded better had not the management of the forests been taken from the Commissioner of Kumaun in 1868, for arrangements of this kind take much time and trouble to elaborate. In his report for the year 1867 the Commissioner writes :—"As yet cattle have not in all cases been excluded from the tracts recently made over to the Forest Department, because some time must be allowed to the villagers to make other arrangements. A great many cattle-sheds have been removed from the vicinity of the *sal* forests of the outer range between Haldwáni and the Sárda river and the cross-road has been declared the boundary nearly the whole way." In his report for 1868 the Commissioner writes :—"In another year or two I hope that all the Kumaun valuable *sál* forests will be as free from cattle as those of Garhwál." Unfortunately this is hardly true even at the present day. The same officer introduced the system of having all trees marked by responsible officers before permission was given for felling and commenced arrangements for protecting the reserved forests from fire. Operations, however, appear to have been conducted on too large a scale or were too irksome to the squatters, for, though successful for a time, the occurrence of an unusually dry season led to great loss by fires. But, on the whole, the administration of the forests was a marked success. From the table given in the appendix the receipts and expenditure for the years 1859-60 to 1867-68 show an excess of receipts over charges amounting to considerably over fifteen lakhs of rupees.[1] The forests not only gave a better return but were conserved for the first time, and arrangements were made for the better protection of the young plantations and planting out the denuded tracts.

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[1] This division extends from the Sárda on the east to the Phika river on the west and from the base of the outer hills on the north to the boundary of the Taráí district on the south. I am indebted for the materials for the notice of this division to Major Campbell through the Conservator, Mr. G. Greig.

[2] See Major Ramsay's report on the condition of the forests in 1861 in *North-Western Provinces Gazette* Supplement, 19th December, 1861.

Under the Imperial Forest Department.

Major Pearson took charge of the Kumaun forest-division in 1868, but made little change in the working arrangements. In 1877 the reserved forests in the Kumaun Bhábar were formally demarcated,[2] and it will be convenient to adhere to the arrangements then sanctioned in the following brief description of each block :—

Block 1 comprises the Chilkiya forest, which is one of the largest and most valuable, having an area of about 126 square miles and containing much fine *sál* timber. The more accessible forests in this block were worked by contractors before 1858, and the remainder have furnished the chief part of the timber brought to market since that year. The entire block has been worked, but there are still numbers of mature trees that have been reserved for shade and shedding seed and which may be cut down when the young stock have been established. Fire conservancy has also been successfully enforced for some years and the young trees bid fair to produce good timber.

Block 2, comprising the Garhi Bálchand forest, has an area of 17 square miles, all of which have been demarcated, and of this about 11 square miles have been enclosed with fence and ditch and are protected from fire. The forest is chiefly *sál*, but the soil does not seem suited to produce large sound trees, and its fittest use will be to supply saplings, which can be carted from the spot and will find a ready market in the plains.

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[1] Receipts, Rs 32,90,459 (Kumaun, Rs. 15,01,059; Garhwál, Rs. 17,89,369). Charges, Rs. 17,43,542 (Kumaun, Rs. 8,33,477; Garhwál, Rs. 9,10,065).

[2] See G.Os. No. 407 F.C., dated 5th September, 1877, and No. 173, dated 29th February, 1879.

Block 3 comprises the western Kota forest, which has an area of about 55 square miles and contains much valuable *sál* forest. General Ramsay writes :—"There is no part of Kumaun where *sál* thrives so well as in the Kota Dún, west of the Dhabka river." The Kota forests have been worked like block No. 1 and have supplied much timber to the market during the last twenty years. Fire conservancy has been introduced since 1877.

Block 4, comprising the forests below the Chhakháta parganah, has an area of about 103·5 square miles and consists of *sál* on the *tháplas* or plateaus and some very fir. *haldu* below. The western portion between the Bhakra and the Gaula streams has been worked for many years by the Nawáb of Rámpur,[1] and the eastern portion from the Gaula to Chorgaliya by contractors and for canal-works and building purposes in Haldwáni. The only large tract remaining unworked in this block is the Nandhaur valley.

Block 5 is known as the Horai forest. It has an area of 14 square miles and lies below the hills. It contains some valuable *sál* forest, of which the eastern half has been enclosed with fence and ditch.

Block 6, or the Káli Kumauṇ forest, has an area of about 230·5 square miles and consists entirely of hill-forest, of which the lower slopes and more easily accessible parts have been worked out by contractors. Still there is a larger area of unworked *sál* forest here than in any other block of the Kumaun Bhábar.

Block 7, or the Dhyánirao forest, has an area of 68 square miles, of which about one-third is *sál* forest and the remainder is chiefly *khair* and mixed jungle and open plains, on which immense numbers of cattle graze.

Block 8, known as the Chela forest, has an area of about seven square miles, of which about a quarter is *sál* forest and the remainder is chiefly *haldu* and bambu.

Block 9 comprises the Barmdeo forest, which has an area of 7·3 square miles and lies at the foot of the hills near the Sárda river. It contains some promising young *sál* forests, besides *khair*, *sisu*, and bambus.

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[1] The Nawáb of Rámpur is allowed to export every year 200 trees, not less than 5½ feet in girth, free of duty.

Block 10, known as the Sárda forest, comprises a number of islands in the Sárda which are covered with *sisu* and *khair* forest and have an area of about eight square miles.

Block 11 comprises a small patch of *sál* forest on the Sárda about three miles above Banbasa measuring 320 acres, recently transferred to the Imperial Forest Department, which has charge of all these demarcated forest blocks, and the remainder of the forest area is managed by the Commissioner of Kumaun. As a rule, the good *sál* forests consist chiefly of *sál*, but there are also patches of *tún*, *khair*, *sisu*, *sándan*, *gosam*, *sain*, *haldu*, *dhauri*, *bákli*, and bambus, all of which are rising in value every year. The cart-road from Barmdeo to the Ganges is connected with cross-roads to the different blocks and temporary roads are made when necessary.

In the young forests the trees differ materially in different localities. In some places where the soil is suitable and other circumstances have favoured the growth of the young trees, they are exceedingly fine and show straight stems, clean barks, and fine heads. In other places where the soil is poor, but more especially where the numerous cattle stations formerly existed, and where in consequence the young trees suffered continually from being lopped, barked, and otherwise injured, and where they were more exposed to repeated fires, the trees are knotted, crooked, and with poor heads. The best forests in the eastern tract are perhaps those above Barmdeo, near the junction of the Ladhiya with the Sárda, where, owing to the favourable nature of the soil, the *sál* has developed to a remarkable degree and, owing to the difficulty of carriage, the trees have been left uninjured by speculators and contractors. Next in importance come those to the west and north of Chorgaliya and those on the flats and plateaus above the Jagbura and Kulauniya streams, and next the *sál* forests in the valleys of the Nandhaur and Sarálragadh streams. The geological formation in the last tract is sandstone and massive boulders. Further west there are still valuable forests between the Kosi and the Rámganga, and there can be little doubt that in the course of time the forests under a careful system of conservancy will renew their pristine vigour and well repay the care and money expended upon them.

Iron Company's forests.

The only important private forest is that belonging to the Kumaun Iron Company, whose grant extends from the Manár Gadhera, about one mile west of the Dhabka, as far as the Bhakra river, about half way between Káládhúngi and Haldwáni. The grant is bounded on the north by the Himálaya and on the south towards the Bhábar by a line of pillars, and the area is about 350 square miles. The collections from this tract for timber and minor forest produce from 1861 to 1881 have amounted to more than two lakhs of rupees, and it now constitutes one of the most valuable forests in Kumaun. It is difficult to say what portion of their rights Government resolved to grant to the company, for the deed was never executed, but from the draft it would appear that only fuel-rights were intended, and certainly none other is expressed. The subject of these forests and the company's claim to them being now under the consideration of Government, it will not be necessary to allude to them any further.[1]

Climate, &c.

The climate in some parts of the tract below the Kumaun hills is fair from November to June, but in other parts it is very fatal in November and after April. During the cold-weather the Bhábar forests present a busy scene. They are then filled with wood and bambu cutters, labourers hauling out timber, men and women collecting *bábar* grass, making mats and baskets, gathering roots, leaves and plants used in medicine or the arts, or herding cattle. After April all, except those who have become acclimatised, leave the forests, and during the rains they remain practically closed. Ordinarily every hill stream becomes then a raging torrent often impossible to cross for several days. Elephants and tigers, though now less numerous than in former times, return to the haunts from which they had been driven during the hot weather : the prairies become a sea of grass and the undergrowth in the thick jungle presents an obstacle to moving about most difficult to surmount. To the unacclimatised these forests are deadly during the rains, and few survive the malarious fever that a night's residence within them then frequently gives rise to. There is no doubt, however, that the clearances effected by the Bhábar cultivators have done much towards ameliorating the climate, for places where man could not formerly exist are now the centre of flourishing colonies, the inhabitants of which remain all the year round in their villages.

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[1] See for a sketch of the Company's history.

Naini Tál forest-division.

The forests in and around the settlement of Naini Tál were demarcated in 1865 and now form the Naini Tál forest-division.[1] Previous to 1845, all the trees in the neighbourhood were considered to belong to the villages within whose boundaries they were situate, and those within the valley were alone protected. Some years later, the Commissioner took over the forests in the neighbourhood of the settlement and allowed no timber to be felled without his permission. A small establishment was entertained to patrol the forests and a royalty was levied on each tree felled to meet the expense. In 1865, the forests were taken over by Government, and have since then been managed chiefly with a view to supply the local wants of Naini Tál. *Chír* of a good quality for building purposes is abundant and the various species of oak and the rhododendron afford materials for charcoal. In 1879, these forests were gazetted as 'protected,' and now comprise about 38 square miles. *Deodár* plantations have been made with marked success along the slopes of Lariya kánta, and *bánj* and *tilonj* and *kharsu* oaks, also walnuts, horse-chestnuts, and ash have been extensively sown and planted. An attempt to reproduce the cypress was thought to have failed, but the seeds have germinated after remaining a long time in the ground.

Ránikhet forest-division.

The Ránikhet forest-division is, like the preceding, intended to control and provide for the local supply of timber and fuel to the Ránikhet settlement. The Imperial Forest Department deputed an officer to take charge of the forests around the intended military station in 1867, but it was not until 1873 that the forest boundaries were finally settled and operations regularly commenced. The tracts now conserved[2] are fifteen in number, of which one having an area of about seven square miles is closed and surrounded by a ring fence of thorn and is 'reserved' and clear of all private rights. It contains pine, oak, rhododendron, and other woods of minor value. The other forests which are 'protected' and cover an area of about 59 square miles are situated at distances varying from one to 24 miles from Ránikhet, and are held conjointly by Government and the inhabitants of the villages within whose area they occur. The latter have a right to graze their cattle and cut wood for fuel or for building or agricultural purposes, but no power to cut for sale to any one. But the great feature of this division is the nursery which, though commenced only in 1871, has done much good in distributing[1] fruit and timber trees all over the province and in conducting acclimatisation experiments.

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[1] Reserved by Nos. 149 and 150, dated 21st February, 1879.

[2] See G. Os. Nos. 176 and 177, dated 26th February, 1879.

Garhwál forest-division.

In Garhwál, as in Kumaun, the contract system remained in force and, in 1839, we find the right of collecting the forest and pasturage dues of the Pátli Dún leased to one Padam Singh for twenty years at a fixed annual rental of Rs. 2,750, of which Rs. 1,649 were on account of the *káth-báns* section. The forests here are amongst the most valuable both for timber and bambus that exist along the whole line of hills between the Jumna and the Sárda, and the loss that must accrue should this arrangement continue was brought[2] to the notice of Government in 1853. The result of the correspondence that then took place was that Padam Singh's rights were purchased for Rs. 15,000, and the forests were taken under direct management and transferred from the Bijnor district[3] to Garhwál, whilst the collection of the dues from the Khoh river westward still remained with the plains authorities. Posts were established at the outlets of the Kotri and Pátli Dúns for the collection of dues from exporters, and the surplus revenue was devoted to opening up roads and improving the forests. In 1854, Captain Reid took over the management and remained in charge until 1858. Captain Reid attempted little in the way of conservancy, but commenced felling operations on a large scale and erected a saw-mill that could not be worked owing to a defect in the slope of the canal that was to afford the motive power. The mutiny then intervened, and in 1858 the forests came under Major Ramsay, who introduced the system of conservancy that we have noticed in the account of the Kumaun forest-division. His administration was marked by the control of felling operations, the removal of squatters from the valuable forest tracts to available land fit for cultivation below the forest boundaries, the construction of roads and the establishment of stations for the collection of revenue at convenient intervals. In 1861-62, cultivation in the Pátli Dún was put a stop to by assigning lands to the people in the Bhábar, and the cattle-stations were broken up and removed from the reserved forests. This operation occupied three years, from 1862 to 1865, the cattle stations being removed from all the Garhwál forests, and in Kumaun from all the forests above the main line of road. In the meanwhile excellent roads were opened out, and the forests, especially those of Garhwál, were made accessible from all sides: at the same time a regular system was instituted of working only certain forests, the remaining ones being kept rigidly shut up, and the selection and marking of all trees previous to felling was insisted on. The felled timber left by the old contractors and Captain Reid was exported and sold and the machinery of the saw-mill was transferred to Rúrki. Colonel Baugh acted as Conservator under Major Ramsay and an establishment was entertained to prevent the felling of timber without license, to protect the forests from fire, to cut down creepers and to mark trees for felling. The management of the forests was transferred to the Imperial Forest Department in 1868, and, in 1879, the whole forest-division of Garhwál from the Rámganga to the Ganges was divided[1] into five blocks, an arrangement that we shall observe in the following brief description:—

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[1] 12,000 grafted plants have been distributed to villagers and householders, besides some 32,000 forest and ornamental plants, and about 400,000 forest trees have been planted in the reserve from the nursery.

[2] By Mr. (now Sir John) Strachey, to Commissioner, 4th August, 1853; from Government, No. 3747, dated 17th September, 1853.

[3] The collections of the forest and pasturage dues from the Kotri Dún, including Udepur, was handed over to the Superintendent of the Dún and the Collector of Bijnor in 1849. In 1853, the dues from the Kotri Dún and the Rawásanwár part of Udepur amounted to Rs. 1,403, and from the Rawásan-pár portion to Rs. 1,011 a year; total of Garhwál, Rs. 5,164.

Block 1 comprises the Pátli Dún forest with an area of 237·5 square miles. It is bounded on the east by the Kumaun boundary and on the west by the Paláin river to its junction with the Rámganga, and thence down by the Rámganga to the Bijnor district.

Block 2 comprises the forests of the Kotri Dún with an area of about 180 square miles, and is bounded on the east by the Pátli

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[1] F. 162, dated 24th February, 1879.

Dún forests and on the west by the Khoh river to the Kotdwára mart, thence by Jamangarh and the Lálpáni ridge to the Saneh depôt on the Ganges road.

Block 3, known as the Saneh forest, has an area of 17 square miles and lies between the Khoh river on the east and the Málin river on the west as far as the Chaukighâta mart.

Block 4, known as the Láldháng forest, has an area of 36·5 square miles and lies between the Málin on the east and the Rawásan river on the west.

Block 5, comprising the tract between the Rawásan and the Ganges known as the Khára forest, has an area of 88 square miles.

Block 6, known as the Kartiya forest, has an area of about 800 acres. It consists chiefly of *sál* and is situate on the left bank of the Mandhál stream.

The northern boundary of all these blocks lies between the cultivated area of the hill villages and the forests proper, and the southern boundary is found in the road between Kotirao on the east and the Ganges on the west.

Pátli Dún forests.

The Pátli Dún forests occupy the valleys of the Rámganga and its affluents and the ridges which run between their watersheds. The geological formation of this tract consists of alluvial deposits and drift in the valleys and plateaus, and massive grey sandstone interspersed with blue shale on the ridges. The whole Dún has been a noble forest of *sál*, the lower and more accessible portions of which have been worked out, but in which enormous tracts of virgin forest still remain, from which under judicious treatment inexhaustible stores of timber may be drawn. Excellent roads were constructed though the principal valleys by Major Ramsay, and these have been kept up by his successors. The forests of this tract may be conveniently divided into those (1) of the Paláin or Taimúriya; (2) those of the Mandhál; and (3) those of the Rámganga, south Pátli Dún and Sona river.

(1) The whole basin of the Taimúriya and its affluents contains a noble *sál* forest. This tract was considerably thinned out many years ago for wood for the gun-carriage agency, but not to a too great extent, as the result has been satisfactory in the

improvement of the growth of second-class trees as compared with the condition of the same class of trees in those portions of the forest which have never been overworked. Throughout this tract since conservation has been enforced the growth of *sál* saplings gives hope of an unlimited supply of this valuable timber. This growth is fostered by the ground becoming thickly clothed everywhere with bambus, by which the moisture is retained in the soil and the increase of other grasses is prevented, and thus the risk of fires is materially diminished.

(2) The forests of the Mandhál owing to their remote position have never been much worked. There are here in consequence to be found a large number of first-class *sál* trees as well as an abundance of trees of every age and size. The good forests may be said to extend over about fifteen miles in length through all the lower portions of the valley below Jarat, on the slopes and plateaus facing the north and on the opposite bank of the Mandhál over the last five miles. On the plateaus above the river the *sál* has attained a very large size and fine *tún* trees exist in the valley which seems particularly well adapted to their growth.

(3). The forests of the valley of the Rámganga, the south Pátli Dún and the Sona are all situated on the hills sloping down to the Rámganga and its affluents, the Sona and Gaujhera nala on the right bank and the Maira Sot, Patharpáni and Dharau streams on the left bank. These forests were 'felled even to desolation' years ago and many parts of them have been permanently injured. No attempts at reproduction were made, and the land where fine *sál* forest once stood is now too denuded by exposure to admit of efforts in this direction proving successful. There are, however, some good young plantations springing up and some mature trees, as already noticed, exist in the Mandhál valley. The exceptions are places where the old trees have been completely cut away, and here, there being no natural shade or seed-sowing, the dense grass effectually prevents all artificially sown seeds from germinating, and though measures have been taken from time to time to reproduce the forest, they have met with only very partial success. There is still, however, some *sál* in the highlands, some *sisu* along the rivers and *tún* in the valleys, and a fair amount of *khair* and good grass in the open level ground. Below the Siwáliks there are great bambu forests on the level flats that afford a considerable revenue. The great question of fire conservancy has always engaged the attention of the establishment, and up to 1879 no great injury had been done for several years. In 1879, however, the cholera-stricken pilgrims returning from the Hardwár fair spread fires in every direction, and considerable damage to the young plantations resulted. Roads have been opened to all the principal blocks in connection with the road from Kotirao to the Ganges that forms the southern boundary of the division.

Kotri Dún.

The forests of the Kotri Dún lie between the Pátli Dún on the east and the Khoh river on the west. The formation of the soil is sandstone and drift and there is little water and few good forests. The trees are almost entirely *sál* differing in value in different places according to the soil and other natural circumstances. Few tracts in this forest have not been worked more or less, but there still remains some good timber on the more inaccessible ridges. Since this forest has been rigidly protected the young trees have made considerable progress, and the keeping out of cattle and fires will in a few years do much to restore them to their original condition.

Blocks 3 and 4.

Blocks 3 and 4 lie between the Rawásau and the Khoh rivers, a distance of about sixteen miles. The soil is a dry sandy loam with outcrops of gravel and blue clayey slate in the hills. The entire tract appears to have been extensively cultivated in former times, but there is a great want of water through all the lower forests. There are here three large *sál* patches. The first along the Rawásan has been extensively worked and little valuable timber remains; the second along the Chaukighát́a stream contains some mature *sál* trees and in the valleys *tún;* and the third is a young *sál* forest in the south-east corner of the division, about three square miles in extent. *Bahera*, *saín*, and *haldu* are also found on the lower plains along the southern boundary, but bambus, which grow luxuriantly everywhere, form the main article of export from both blocks.

Dehra Dún forests.

The early history of the forests of Dehra Dún has much in common with that of the eastern forests in Kumaun and Garhwál. Both the Garhwál

Rájas and the Gorkháli Government derived a considerable revenue from the various items of forest produce grown in the Dún and adjacent hills. This was usually levied as a transit duty and was collected with the export and import duties on every article of commerce entering or leaving the Dún. The aggregate amount of these duties in 1809-10 was Rs. 16.000, and in the following year was Rs. 15,200, of which over one-third was absorbed in paying the collecting establishment. The transit duties were abolished at the conquest, and with them the duty on the export of forest produce, which, though a legitimate source of income, was lost sight of until Mr. Moore took it under his management in 1819. For three years the duties on exports yielded a revenue averaging Rs. 4,000 per annum, and in 1822 were leased to one Surjan Negi for four years at Rs. 5,000 a year. In 1825, Mr. Shore gave new leases for five years to various persons for all the collecting stations, except that at the Kheri pass, at an aggregate demand of Rs. 8,500. In making these arrangements it was distinctly laid down that these dues were not to be regarded as transit duties, but as rent for the use of the forests and as a royalty on their products, and on this principle all subsequent settlements were made.[1] Curious to say, Mr. Shore[2] was averse to preserving *sál* and devoted all his attention to the propagation of *sisu*, going so far as to import seed for this purpose from Fatehgarh. It does not appear that any attempt was ever made to conserve the forests on any system or to control felling operations, and in 1829 the revenue had fallen off so much that balances amounting to Rs. 6,000 had to be written off on account of the leases granted in 1825. Major Young then took charge of the forests and offered the right of levying the forest duties to public competition by auction. The experiment was fully justified by the results, giving a revenue of Rs. 6,425 for the *ghâts* on the Jumna and Ganges and of Rs. 9,595 for the passes to the plains, or a total of Rs. 16,020. The duties were farmed at these rates for the years 1830-31 to 1832-33, when another auction sale gave an income for three years longer of Rs. 25,345 a year. From 1839 to 1844 the farm was leased to Atmagir, a Mahant of Hardwár, for Rs. 35,000 a year, and at the conclusion of his lease the forests were taken under direct management by Mr. Vansittart and so remained until 1855, when a forest establishment was formed. A sál log which would then fetch at Meerut between forty and fifty rupees and could be carried on a four-bullock cart paid an export duty of only eight annas. Five of these carts could carry out one hundred maunds of good lime worth over Rs. 100, the duty on which was only twenty annas. A four-bullock cart of catechu sold for Rs. 200 in the plains, and a similar load of bambus (about 400) was worth eighteen rupees. It can therefore be readily understood how eager speculators were to enter into this profitable business, especially as no control whatever was exercised over their operations either as to the quantity of timber cut down or the localities to be worked. Mr. Williams writes:—"Every one continued to hack and hew away at the trees as he pleased, only paying certain dues to the farmer in the event of the wood being exported. The latter made his own arrangements to secure the collections at the different passes. Reckless waste was inevitable and the fine *sál* forests began to disappear rapidly. The absence of conservancy was absolute. The district still abounded in fine trees from one hundred to two hundred years old and upwards. All these fell before the axe, and probably the rest would have gone with them had the roads been a little better. The consequences of this bad system are most perceptible in the western Dún;" whilst in the eastern Dún large numbers of *khair* trees were cut down to burn lime for the Rúrki workshops and the canal head at Mayapur.

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[1] To Commissioner, Kumaun, 15th September, 1896. [2] In appendix A.2. will be found a list of the rates authorised for collection by Mr. Shore.

With the introduction of a regular forest establishment in 1855 the revenue rose enormously, but unfortunately even then no system of conservancy was attempted. The mutiny intervened and in 1860 the revenue began to fall, and in 1867-78 reached the low figure of Rs. 23,332. In 1864, regular forest operations commenced under Mr. F. Williams, C.S.I., Commissioner of the Meerut division, within which the Dehra district is situate. His jurisdiction extended over the whole of the Dún forests, the Siwáliks and a portion of the Sahéranpur district, besides certain forests of the outer range leased from the Rája of Tirhi. The story of the sub-Siwálik forests in the Sahéranpur district has been noticed in the Memoir of of that district. No attempt of any kind was made to preserve the forests there; on the other hand efforts were directed to induce squatters to take up the land and clear it for agricultural purposes, and grants of so-called waste land were made to any one that could be prevailed on to accept them. Up to 1839 the forests were left entirely in the hands of the Rajpút zamindárs within whose boundaries they were nominally included, but in that year some 142,420 acres were demarcated as forest under the names Kheri, Kánsrao, and Pathari Nadi. Within these boundaries the grants were made and the tracts unlet were handed over to the new Forest Department in 1864. Mr. Williams devoted his attention to a survey of the forests, to making roads and securing and defining the rights of Government and individuals. This was no easy task owing to the neglect of former years which permitted the growth of prescriptive rights by lapse of time. It was not until 1877 that the forests were properly demarcated,[1] and we shall follow the arrangements then made in our brief description of the existing forest sub-divisions.

Existing forest-divisions.

Block 1, called the Siwálik range, is bounded on the west by the Jumna and on all other sides by a forest line marked by pillars. It has an area of 449·12 square miles and contains *sál*, *sain*, and *chír*. The two former are the prevailing trees, but are all young, and the last occurs along the slopes of the hills and on the higher peaks. There is a considerable export of bambus and the range affords pasturage for numerous herds of cattle. Block 2, known as Majhera, lies in the Rúrki parganah and consists of islands in the Ganges well stocked with *sisu* and *khair*. The area is only 6·74 square miles. In the western Dún we have block 3, known as Rámpur Mandi on the Jumna, devoid of trees and only yielding a revenue from grazing dues and grass. It has an area of only 1 54 square miles. East of this comes block 4, comprising the *sál* forest of Ambári and having an area of 6·4 square miles. The *sál* here is immature and is mixed with *sain*, *bákli*, and inferior forest trees.

Block 5, or Chándpur, has an area of 3·38 square miles and contains *sál* mixed with a few *tún*, *sain*, and *bákli* trees.

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[1] The following references are to the notifications of Government demarcating and reserving the forest lands:—73, dated 15th March, 1877 (all the Dún`; 74, of same date (closes Tháno and Balawála): 443 dated 24th September, 1877 (reserves the eastern Dún): 196, dated 19th July (reserves the Pathari forests): 184, dated 27th February, 1879 (reserves all the forests).

Block 6, or Dholkot, has an area of 7·94 square miles and consists of *sál* with an admixture of *sain*, *dhaura*, and a few *tún* trees, but none are mature.

Block 7 comprises the *sál* forest of Tháno in the eastern Dún and has an area of 9·96 square miles. There are no mature trees, but there is a very promising crop of *sál* interspersed with *bákli*, *haldu*, *semla*, *sisu*, and *khair*. Balawála and Tháno have been closed since 1877.

Block 8, or Nágsidh, has an area of 25·38 square miles consisting of *sál*, *sain*, *bákli*, and *haldu*.

Block 9, or Tirsál, is situate near Rikhikes and has an area of 28·22 square miles. All the mature trees have disappeared and only young *sál* remains, intermixed with *dháman*, *haldu*, *sain*, *jáman*, and *khair*.

Block 12, or Saora Saroli, comprises a small patch of *semlá*, *bákli* and *dhámun* near Raipur, with an area of only 1·82 square miles.

Block 13, or the Song forest, consists mainly of *khair* trees and grass.

Block 14 comprises the Patri or Pathari forests in pargana Jawálapur of the Saháranpur district and contains mainly *dhák* and grass appropriated for the use of the Rúrki workshops. Attempts are, however, being made to introduce timber trees, with what success is not yet apparent.

Ganges (Bhágirathi) division.

The Bhágirathi or as it is now called the Ganges division comprises the forests on either bank of the river of that name in the Rája of Tihri's territories. These were leased by Mr. Wilson from the Rája of Tihri in 1859, and in 1864 the lease was transferred to Government for twenty years. About one-third of the drainage area of the Bhágirathi and its feeders is covered with forest and cultivation, of which the forest occupies about one-tenth, or on a rough estimate 600 square miles.[1] From the village of Jhala, close to the point where the Bhágirathi cut its way through the snowy range, to Gangotri, the valley lies nearly due east and west for a length of about seventeen miles and is filled with *deodár*. For a few miles above Gangotri *deodár* is also found, but stunted and of little value. The excelsa pine also extends eight miles up the valley above Gangotri, and the birch is found in patches to within half a mile of the glacier. The forest on both sides of the river is divided into blocks, each of which has been roughly surveyed, giving some 12,500 acres of *deodár* and a fair average of second class, third class and fourth class trees. Before taking over the forests they had been much neglected and injured. "The ravages committed by the cultivators in the western portion of the valley, where thousands of dead trees, all killed by fire, disfigured the hill-side in every direction, were only equalled by the destruction committed by avalanches higher up the valley." The former practice has been stopped, but the latter influence continues, and the damage wrought by the cyclone of 1880 will be visible for many years to come.

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[1] See report by Major Pearson, Sel. Rec., N. W. P. (2nd Ser.), II., 117, and III.

Great forests of *Quercus dilatata* occupy the ridges between Masúri and the Bhágirathi, and noble forests of *chír* extend from Sainsa, some twenty miles above Tihri, as far as Bhatwári, a distance of about fifty-five miles along the valley. The latter tree clothes the mountains on both sides of the river and its affluents up to 3-5,000 above their beds, filling every ravine and occupying every plateau. Above Bhatwári the forests of box, yew, and cypress commence and cover the hills on both sides of the river as far as Jhala, a distance of about thirty miles, and from Jhala to Gangotri, as we have seen, the *deodár* is the principal forest tree. On the right bank of the river above Jhala, where it has a southern aspect, the forest is nearly pure *deodár*, but on the left bank, with a northern aspect, there is a large admixture of silver-fir, spruce, and birch. Up to Daráli the *deodár* extends to about a thousand feet above the river's banks, but further north it rises to fully two thousand feet, where it meets the vast forests of spruce and silver-fir already mentioned. The valley of the Jádh-ganga is also full of *deodár*, and towards its head the valuable pencil-cedar occurs in appreciable quantities. As a rule the growth of the *deodár*, except in very favourable localities, is much slower here than in the comparatively warmer valleys of Jaunsár. From an examination of the stumps of many trees it was found that a diameter of 16 inches was attained in 64 years, of 24 inches in 105 years, and of 30 inches in 230 years ; the nearer the northern limit, the slower the growth. To recapitulate, the forests in the lower parts consist chiefly of pine. Higher up we have the yew, box, birch, three species of oak, two of juniper, cypress, silver-fir, spruce, *deodár*, and excelsa pine, and in small quantities the sycamore, horse-chestnut, and walnut. Only those useful timbers found in the more accessible valleys bordering on the Ganges below Deoprayág and between the Hiunalgadh and the Dún have hitherto been exported, and the revenue collected has chiefly been from *deodár* sleepers and small logs for building purposes and bambus.

Forests at the head of the Jumna and Tons.

The lease from the Raja of Tihri includes the forests in the remaining portion of his territories about the heads of the Tons and Jumna rivers.[1] These lie to the south and west of the Bhágirathi sub-division and may be noticed in order from the Bhágirathi westwards. There are the remains of a considerable forest of *deodár* above Bárahát near Salda and Uparikot in the Bhágirathi valley, and above it a splendid strip of *moru* oak (*Q. dilatata*). Crossing the water-parting into the Jumna valley, there is a small *deodár* forest above Shalna and small patches of the same tree about the Bonk and Nágtiba peaks, whence there is water carriage by the Jumna to the Dún. Crossing the Jumna to the Kedár-kánta ridge which separates the Jumna from the Tons, there are the remains of what was once a very fine *deodár* forest in the valley of the Banal, a tributary of the Jumna that joins it just above Barkot. There are also small patches of *deodár* in the Rámasera valley to the south of the Banál, but of no great value. The chief glory of the Jumna is, however, the immense forests of the long-leaved pine (*chír*) that line its banks and in which there are numbers of magnificent trees fit for any purpose. Unfortunately, sleepers of pine are not esteemed by railway contractors, being liable to dry-rot and requiring frequent renewal, and no means for effectually preserving them have yet been discovered. The left bank of the Tons is also covered with immense forests of *chír*. On the upper part of this river near Datmer, the *chíl* (*P. excelsa*) takes the place of the *chír* (*P. longifolia*). When the range that separates the Tons from the Pábar is crossed, we come again into a tract of which the characteristic forest tree is *deodár*. The *deodár* commences on the north of the Tons near Gangor, and is scattered all over the ridge that separates the Tons proper from the Panch-ganga river which joins the Tons opposite Shankuri. The hills here are rocky and precipitous, and the *deodár* is chiefly confined to the small ravines and streams that run down from them to the river. The more important forest lies between Gangor and Datmer and on the further side of the ridge above Lyor and opposite Kahsol and Raksha.

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[1] Sel. Rec., N.-W. P., III. (2nd Ser.,) 129.

Following the course of the Tons southwards, we find a considerable amount of *deodár* on the spur that comes down to the river a little above the village of Koarbo, also in the valley of the stream next to it on the west. The Rupin joins the Tons on its right bank at Naintwári, and on both its own banks and on those of its feeders are large and valuable forests, the lower part of which consists of *deodár* and the upper part of excelsa pine and silver fir. The valley of the next tributary of the Tons on its right bank also contains a very large proportion of *deodár* forest interspersed in places with silver fir, spruce, and oak. If we take the country from the junction of the Rupin and the Tons as far as the junction of the Tons and the Pábar, some of the finest *deodár* forests in the hills may be met with; and here the Forest Department found a valuable addition to their resources for meeting the demands for sleepers. In 1869, the forests of the upper Tons were estimated to contain 50,000 *deodár* trees fit for felling and to be able to supply a lakh of sleepers per annum, but no such great demand has yet been made on their resources. It is the Jaunsár-Báwar and Bhágirathi divisions that have had to provide the largest number of sleepers in recent years. In the year 1879, the forests on the upper Tons with those in khats Deogarh and Báwar of Jaunsár-Báwar were formed into a new division known as the Tons division.

Jaunsár-Báwar.

The forests of the Jaunsár division now comprise the whole of Jaunsár-Báwar except khats Deogarh and Báwar to the north of the Dharmigádh and Banál, Shalna and Jaunpur in Tihri. They had little or no practical value in the earlier days of British rule, owing to their distance from the plains. With the denudation of the Dún, however, their real value became known, and some rough attempts at management were undertaken. Up to the year 1868, the Commissioner of the Meerut division was *ex officio* Conservator of the Jaunsár-Báwar forests, and when the latter came into the hands of the Forest

Department, everything connected with conservancy had to be taken in hand. Here, as in the eastern hills, the people, though nominally in possession of immense tracts of forest land, were never considered proprietors, but occupiers entitled to the usufruct and whose rights were sufficient to prevent people from other *khats*—as the local subdivisions of the district are here called—from entering upon or using the nominal waste in their possession. They could pasture their cattle in every part of this nominal area and cut down trees for fuel or for building or other agricultural purposes, but could not alienate these rights to others. The Dún forests were being worked out whilst the demand for sleepers for the railways was increasing every year, so that it became necessary for the authorities to examine closely their timber resources, so as to meet the wants of both the Government and private persons, present and prospective. It had been shown that permission to graze cattle in a forest was absolutely incompatible with forest conservancy. Provision had also to be made for stopping the destructive fires that, hitherto, regularly swept away every year the young trees that a suitable soil and climate had raised to fill up the gaps caused by felling. The people were accustomed to obtain early grass in the hot weather by setting on fire the old grass, provided rain fell at the right time. This is the chief reason given for their adherence to this practice, but it has been shown that the rank crop of grass that occurs after firing is much coarser and less nutritious than if nature had been allowed to deal with the reproduction of the plant in its own way. Each one, too, imagined that he had a prescriptive right to hack and hew when and where he desired. The weak establishment hitherto kept up was insufficient to control the felling of timber, and it was not uncommon for a Jaunsári, who wanted one tree to repair his homestead, to cut down eight or ten and sell the surplus. To remedy these evils, the forests had to be demarcated, then grazing and the felling of timber in unauthorised places had to be restricted, and, again, fire conservancy had to be introduced. To prevent unlawful felling in the demarcated tracts an officer was usually deputed to inspect the work before a pass was given to fell trees. The people objected to this, as it gave them trouble, caused delay, and cut off one source of their irregular gains; so that in a short time a great cry was raised against the demarcation of the waste lands as

Government property. As already noticed, at the former settlement, the right of each *khat* in the lands within its own boundary was declared absolute as against all other *khats;* the use of the wood and jungle products was allowed to them, but it was held that they had no right as against Government—*i. e.*, Government could at any time step in and appropriate any portion required for its own use or for settlement with others, so long as sufficient lands were left for grazing purposes to each village. Since that time circumstances have greatly changed and almost every considerable tract containing forest useful for timber or fuel has been appropriated and marked off as first or second class forest. A large area has been taken possession of at Chakráta, sufficient for all the requirements, present and prospective, of the cantonment there. What remains is good for grazing or for grass and jungle produce or possibly for some extension of cultivation. It is good for little else, and there is no prospect of its being turned to any other account. There is probably no portion of this land that can be used either for tea cultivation or for any kind of plantation. Under these circumstances the question arose whether the restriction as to proprietary right being acknowledged in anything more than the cultivated and occupied spots should be maintained. Sir W. Muir resolved[1] that only such waste lands in excess of the requirements of a *khat* should be marked off as "Government waste" that were in excess of one thousand acres. That within the *khat* proprietary right should be exercised over all third-class forest land to such extent as each *khat* might require, with the provision that had always existed that there should be no power to alienate the lands. The restrictions as to grazing and collecting firewood were confined to first-class reseved forests. Such concessions as were then granted and such restrictions as were then enforced were entered in the *wájib-ul-arz* or 'record-of-rights' of each village, so as to prevent any disputes in future.

The Jaunsár division is entirely surrounded by Native States, except on its southern boundary, where it adjoins the Dehra Dún. The main physical feature is the great central ridge that forms the water-parting between the Jumna and the Tons. Commencing at Haripur-Biás near Kálsi, it runs west of Chakráta to Deoban, and then in a north-easterly direction to the Karámba peak. It next turns round the head-waters of the Dháragádh and proceeds eastwards into Tihri. It is along this ridge and its numerous spurs that the chief forests are found. The rocks are principally limestones, shales and slates. The first-class forests within this tract measure 8,795 acres, and the second-class forests cover 88,282 acres. The first-class forests are entirely within the control of the Forest Department with the exception of some 575 acres, within which grazing rights are permitted. Of the second-class forests some 13,917 acres are temporarily closed and are preserved from fire to allow of reproduction. The division forms a section of the outer Himálaya and the forest vegetation varies accordingly. At Kálsi on the south we have such trees as *sál*, *bákli*, *dhaora*, *kúsam*, *haldu*, *khair*, and *sisu*, some of which run a long way up in the hot and confined valleys of the Tons and Jumna to an elevation of nearly 4,000 feet. We have next the grey oak, rhododendron, and *Andromeda* between 5,000 and 7,500 feet. At the lower limit we have the *chír* pine and at the upper the blue-pine and the *deodár*. Above these, 7,500-10,000 feet, come the *deodár*, *moru* and *karshu* oaks, four species of maple, horse-chestnut, walnut, cypress, spruce and silver fir, yew and several species of *Pyrus* and the willow. Of all these, the *deodár* is the most valuable, and it is now found in the Lohkandi and Kotikanásar forests in khat Misán : the Konain forest in khat Lakhan ; the Tutwa, Maura and Lakhan forests on the Dháragádh ; the Chijál or Kathiyán forest in khat Phanyár, and the Koti forest in Báwar. Of these the Lakhan forest is the finest, but it is doubtful whether the Dháragádh can be utilized for the transport of timber. The revenue and exports of timber will be found in the appendix.

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[1] G. O. No. 30A., Revenue Department, dated 4th January, 1872.

Forests of the Upper Himálaya in British territory.

The forests of the Upper Himálaya in Kumaun and British Garhwál contain very little *deodár* and are composed principally of *chír* pine, spruce, silver-fir, oaks, horse-chestnut, and other trees of small economical value, and consequently, except those on the upper feeders of the Alaknanda,[1] have hitherto been little

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[1] See Webber's forest survey of Kumaun and Garhwál, 1864-65, which gives colored maps on the scale of one mile to an inch in sheets of twelve inches square, accompanied by tabular statements showing the acreage and number and class of trees in each block.

Northern Garhwál.

worked. From these latter a large number of *chír* sleepers has been supplied to the East Indian Railway. There are several fine forests of *Abies Smithiana, A. Webbiana* and *Pinus excelsa* along the left bank of the Alakuanda from Joshimath to Pipalkoti, but they occupy the tops of the ridges at some distance from the river. The long-leaved pine covers the slopes of the Nagoli valley opposite Nandprayág, the Nágpur hills opposite Chhatwapípal, and the valley up to Pokhri. The forests on the upper part of the Mandákini and in the valley of the Madmaheshwar rivers are too distant to be of economical value. Similarly, the fine *chír* on the slopes of Tungnáth are too far from the river to bear the expense of export, though, perhaps, the box-wood, of which there are some good examples, may prove of use. The cypress and excelsa forest on the Bishunganga near Badrináth is also too far removed from the means of carriage to be suitable for working. The pine forests near Tapuban on the Dhauli are the most extensive in Garhwál. They stretch in one unbroken block from the western spurs of the Pilkhúnta range to above Ríndi, a distance of sixteen miles with a breadth of from one to three miles. All this is a mixed forest of *Abies Webbiana, A. Smithiana, P. excelsa*, cypress and a few *deodár*, with box, yew, and *Quercus semecarpifolia*. The sycamore (*Acer pictum*, Thunb.), from which the Tibetan bowls known as *lahauri-doba* are made, is found in the valley of the Ríniganga with horse-chestnut (*Æsculus indica*) and silver fir. Higher up the Dhauli as far as Malári similar forests occur, and here also is the only natural *deodár* forest in British Garhwál, but unfortunately so placed as to be useless for export.

Southern Garhwál.

In Southern Garhwál, there are *chír* forests on the Nayár at Kainúr, Sungarkhál, and Juniyagarh, and on the Dúdúkatoli range, great forests of silver fir and spruce cover all the summits up to 8,000 feet. The western slopes of the same and adjoining ranges are clothed with dense forests of oak and other trees of some value to the extent of about fifty square miles, of which the silver fir occupies eleven square miles. Below Kainúr, the Nayár might be used for transporting small timber during the floods, but the Chhíphalgháti river is too shallow for this purpose and too much obstructed by boulders, though fine *chír* trees are to be found on both its banks and at Saimkhet and Tál. The Dhanpur hills have been cleared of jungle for the mineral works. The eastern slopes of the Dúdúkatoli range are covered with oaks and some seven square miles of silver fir and they drain down to the Rámganga. A fine *chír* forest nearly fifty square miles in extent occupies the valleys leading to the Rámganga between Lohba and Ganái, and the pine-clad slopes of Badhángarh and Bhatkot have a similar direction. The Rámganga appears to be large enough for floating down sleepers during the time of flood, and these forests may prove a useful reserve hereafter. All the hills below Ganái are covered with stunted and twisted *chír*. Extensive *chír* forests of good quality exist at Ránikhet and Syúni, and have already been noticed: also along the Gágar range and in the Malwa Tál, Rámgarh, Saimkhet, and Khairna valleys, and at Badhándhúra on the Kosi. The Kosi appears to be unfit for rafting except in the floods, when small timber might be sent down it to Rámnagar.

North-eastern Garhwál.

The pine forests on the Pindar from Betuwa to Kulsári adjoin the river where it is 3-600 feet wide. From May to October, the floods are incessant and sufficient to float the largest timber to the Alaknanda at Karnprayág, and thence to the Ganges at Hardwár. There are no rocks, rapids or obstructions the whole way, and the fall is about fifty feet to the mile. The cost of felling is about two annas per tree, and the cost of carrying and shooting down large trunks would be from two to five rupees each according to the distance or, if previously cut into sleepers, about one anna per sleeper per mile of land carriage. Sawing can easily be arranged for by imported labour. For three or four miles above its junction with the Pindar, the Kailganga might be used for sending down small scantlings of the pine which grows abundantly along its banks, but the cypress appears to be too far up to admit of working. The Nandákini, for the first fifteen miles from its junction with the Alaknanda, possesses sufficient volume in times of flood for the transport of sleepers from the magnificent forests along its banks. The extent and variety of the pines here are nowhere surpassed. They grow over the entire valley, six different species being indigenous and a diameter of five feet is a usual size. The spruce forest above Kanáli is the most important, but cypress and *deodár* also occur with yew, hazel, box, and all the other pines except *Abies dumosa.*

Northern Kumaun.

The upper valleys of the Sarju and its tributaries contain over a hundred square miles of fine pine forest. About and above Kapkot there is nothing but pine; much of it, however, is practically inaccessible, and as the Sarju is not a snow-fed stream, rafting can only take place in time of occasional floods in the rains. The valley of the eastern Rámganga down to its junction with the Sarju has a considerable extent of *chír* and silver-fir forest along its banks, but the river itself presents some obstacles to rafting. *Sál* also occurs in the valleys of the Sarju and Rámganga, but of little value as timber. There is a considerable amount of pine forest near enough to the Káli, and about Askot and Balwakot some very fine timber. Indeed, almost all the valleys leading down to the Káli between Askot and Barmdeo contain an abundance of *chír* of very fair quality. The Gori has a volume in time of flood nearly equal to the Pindar, and there is no obstacle in its course from the pine districts to the Káli. The *chír* forest along its banks, especially near Mastoli, are inferior to none in quality or quantity. The banks also are well-adapted to shooting down logs into the river, and labor is cheap and abundant. A mixed forest of silver fir and *A. dumosa* with box occurs on Húm Dhúra, but apparently too high up to be available for timber. The forests around Chipula abound with horse chestnut, sycamore, birch, yew, poplar, and wild fruits which grow up to 11,000 feet, above which is bare grass and rocks covered with snow till June. These are all too remote from the river to be available for timber for export. In the upper valley of the Káli there are numbers of *chír* along the precipices close to the river, scattered patches of the hemlock-spruce (*A. dumosa*) intermixed with the excelsa pine and considerable blocks of the silver fir, here called *wúman,* which occurs also in the Dárma valley, too far from the river for export. Box is found in the Gori valley near Milam, and in the Byáns patti under the name *pápri.* The grain of the wood appears to be coarser than that of the European species. The yew is as good as the European species for turnery and all purposes. The holly is close and even grained, and fit for turnery, and the species of birch known as *púya-utís* yields a wood for doors and panels that bears a very high polish and is one of the best that we have. Besides these, maple, hazel, birch, wild apples, wild cherries and pears abound, all of which have their value as timber for turnery and other purposes. It cannot be denied that, as in the case of mines, much of the valuable timber trees of the inner Himálaya are in such a position as to render them practically useless for export; but should the necessity arise, some mechanical contrivance will doubtless be invented for the better and more easy removal of the logs to a stream that can carry them to the plains. The shoots that have been in use in Jaunsár for some years have materially assisted manual labour, and when advisable, the same principle can be applied to the removal of valuable timber from the forests of British Garhwál and Kumaun.

Forest Department.

We have now briefly sketched the character and position of each of the great State forests, and shall proceed to describe the system under which they are managed. The expenditure under 'forests' is divided broadly into that incurred on account of 'conservancy' and that for 'establishment.' The establishment protects the forests from trespassers, prevents unauthorised felling of timber, cuts down creepers and noxious undergrowth, marks trees for felling, repairs the fire lines, and superintends felling operations, both those undertaken on behalf of Government and those carried on by private individuals. The forest officer himself decides when felling operations may be undertaken, the principle observed being to work out distinct blocks as well for the sake of more easy supervision as to enable the department to open or close distinct areas at the same time. It is also the duty of the forest officer to superintend the felling, sawing, collecting and carriage to the depôt of the timber collected for Government; the counting, stacking, and classification of the logs in the depôt and the settlement of the accounts of contractors; the repair of old roads and the construction of new ones. The forest officer has charge of the collection of tolls at the forest stations. These are situate along the main lines of forest road, and in each there is a clerk and several peons. On the arrival of produce of any kind liable to toll, the clerk examines it, and the quantity and the duty received are entered in a book arranged in the form of a receipt and counterfoil. The clerk hands the receipt over to the exporter, and forwards a copy of the counterfoil to the head-office of the forest-division. The exporter proceeds with his load until he is stopped at a second line of posts established where the forest roads converge on the main public roads. Here he gives up his pass, and the goods are again checked and any deficient duty is collected. These passes are also sent to the head-office and compared with the copies of the counterfoils previously forwarded by the clerks in charge of the first line of posts. Deputy overseers inspect each post, and rangers patrol the intermediate spaces to prevent smuggling; and in addition the smallness of the tax makes it hardly worth the trouble and risk necessary to successfully evade the payment on petty ventures. It is only when the exporter bribes the whole establishment and removes valuable timber wholesale that any profitable result can be expected, and this may be considered a very remote contingency. The revenue collected is forwarded day by day from post to post to the nearest treasury, and the official in charge reports the amount received from each post to the head-office of the division, and this is again compared with the total entered in the passes and counterfoils.

Timber marts.

The principal timber depôts in the Kumaun forest-division are those at Rámnagar and Moradabad, and the markets for minor forest produce are at Chorgaliya, Haldwáni, Káladhúngi, Chilkiya, and Rámnagar. The Naíni Tál forest-division finds its market in the settlement itself. It has a special local conservancy staff, who superintend the felling of trees for timber, fuel and charcoal, the dues on which are collected according to a special table of rates. The Ránikhet forest-division is purely conservative and supplies only the local demand in the Ránikhet settlement. Khohdwára or Kotdwára, as it is more commonly called, is the great mart for the exchange of minor forest produce in Garhwál, and, for the sale of timber, depôts have been established in this division, both on the Rámganga and on the Ganges. Hardwár on the Ganges and Rájghát on the Jumna are the two great timber depôts for the whole Himálayan tract between the Ganges and the Tons, including the Dehra Dún, Jaunsár, and Bhágirathi forest-divisions. A considerable amount of timber and minor forest produce, however, finds a way to the plains through the passes in the Siwáliks to Sahâranpur, Dehli, and Meerut. Good roads connect all these marts with the different lines of railway, and with the extension of the existing line from Bareilly to Pilibhít and Naini Tál, the communication, so far as Kumaun is concerned, will be complete and the value of the minor forest produce will be enhanced considerably. In appendix A. will be found a table showing the rates now levied on timber of all kinds and minor forest produce in the Kumaun forest-division. It has not been considered necessary to give these tables for every forest-division, though they vary slightly in details in each tract. Enough has been given to furnish a fairly accurate idea of the extent and character of the State impost on forest produce. Perhaps the most curious fact elicited is the number and variety of the articles coming under the head 'minor forest produce.' Here we have the drugs, tans, dyes, gums, reeds, fibres and grasses of the preceding pages, with the toll that is levied on them by Government, and the average annual export from the forest-division based on the returns of four years. It has been found impracticable to give a correct selling price for these articles: so much depends upon the locality and circumstances. The greater part is collected and exported by the poorer classes who exchange their goods for grain or clothes and earn but a scanty subsistence. Still confining our remarks to the Kumaun forest-division, some idea of the extent of the felling operations will be gathered from the fact that, between 1859-60 and 1879-80, the timber cut and and sold by Government agency amounted in this division alone to 3,040,241 cubic feet and the quantity cut and exported by private agency amounted to 2,620,607 cubic feet between 1865-66 and 1879-80. The greater portion of this timber was *sál* of good quality, though of late years second-class timber has come into considerable repute. In addition to this, great quantities of dry timber were exported by merchants at lower rates, and in the Kumaun Bhábar, many thousand acres of *sál*, *haldu*, *dhami*, and other trees were cut down and exported to make room for cultivation. No detailed account of the quantity can be given as the duty was usually levied by cart or bullock load. If we remember that similar operations are going on in each of the other forest-divisions bordering on the plains, some idea may be formed of the extensive nature of the forest operations. In Jaunsár and the Bhágirathi valley the principal export is timber for railway sleepers cut and exported by Government agency. Appendix A. gives the revenue and expenditure of all forests for as far back as the records appear accurate enough for reproduction.

Rheea.

Bœhmeria nivea, Hook. et Arn.; *Urtica nivea*, Linn.; *U. tenacissima*, Roxb.—China grass, rhea, rheea, ramie (Malay). Brandis, 402.

The rheea is indigenous in China, Japan, the Phillipine Islands, Java, Sumatra, the Indian Archipelago, Siam, Burma, Singapur, Penang, Asám, and Rangpur and Dinajpur in Eastern Bengal. It is cultivated in China, Japan, and the Indian Archipelago, where it is stated to like a moist soil, and flourishes best in alluvial deposits along the banks of rivers and generally in the fertile flats such as are found in its native haunts in China and Sumatra. The cultivation of the rheea in these provinces dates from the year 1863, and in 1865 there were several small plantations in the Dehra Dún. The Government plantations were begun in 1867 by devoting a small portion of the Chandwála garden in the Dún to the propagation of the plant for distribution to those who desired to embark in its cultivation. In 1870, the regular cycle of inquiries as to the value of the economic products of India brought rheea prominently to notice, and orders were issued for the extension of the existing Government plantations both in the Dún and at Saháranpur. In 1871, a prize of £5,000 was offered to the inventor of the best machine or process for the preparation of the fibre, and in the same year, instructions were issued for the supply of stems for a trial between competitors for the prize and for distribution for preliminary experiments to all who were likely to make use of them both in this country and in England. During the year 1871-72, the area under rheea in the Dún and at Saháranpur exceeded 37 acres, and upwards of nine tons of stems were forwarded to England for the use of intending competitors.

First competition.

The first trial for the prize took place at Saháranpur in August, 1872, when a machine, the property of Mr. J. Greig of Edinburgh, was entered for competition. The following extract from the official report of the trial will show what degree of success was obtained:—

"The machine, as a piece of mechanism, is good; it is well-made and well-proportioned, the relative strength of the various parts having been well considered.

> It is calculated to wear well, and deserves commendation so far as being a good substantial piece of work. The machine, however, as must always be the case with machines of this kind, *i. e.*, contrived to do a work of which there is little or no experience available and without means of obtaining the natural material to work upon, is far from matured. Few, if any, of such machines are ever constructed at once able to do the work for which they are intended; most are generally perfected by degrees through numerous partial failures; experience gained in the process of working alone enabling many defects to be seen and remedied and a perfect machine to be produced, and such appears to be the case with this mill; for, independent of whether it is or is not the best description of machine for preparing the fibre, it is, on the one hand, in many points very deficient in the work the exhibitor sets it forward to perform, while, on the other hand, it is certain that it can be improved in much that is faulty."

Mr. Greig was awarded £1,500 for his machine, in consideration of the skill, labour, and expense incurred in its construction, and in recognition of its being a real attempt to meet the wants of Government.

Second competition.

In 1873-74 and 1874-75, the area under rhea was maintained at 37 acres, and in 1875-76 further instructions were received to continue the supply of stems for experimental purposes. In August, 1877, the offer of a prize of £5,000 was renewed, and the following specification of the machine required was published for general information in India, Europe, and America :—

> "What is required is a machine or process capable of producing, by animal, water, or steam power, a ton of dressed fibre of a quality which shall average in value not less than £45 per ton in the English market, at a total cost, including all processes of preparation and all needful allowance for wear and tear, of not more than £15 per ton, laid down at any port of shipment in India, and £30 in England, after payment of all the charges usual in trade before goods reach the hands of the manufacturer. The processes of preparation are to be understood to include all the operations required subsequent to the cutting of the stems from the plants in the field, until the fibre is in a condition fit to be packed for conveyance to the market. The machinery employed must be simple, strong, durable, and inexpensive, and should be suited for erection in the plantations where the rhea is grown. It must be adapted for treatment of the fresh stems as cut from the plant. The treatment of dried stems offers certain difficulties, and the fibre prepared from them must, moreover, always be much more costly than the fibre produced from green stems. Except during the hot, dry, weather preceding the rains in Upper India (where rhea grows best), it is very difficult so to dry the stems that no fermentation or mildew shall occur. But during this season the stems are comparatively short and the crop poor and stunted, unless it is artificially irrigated, and such greatly increases the cost of cultivation. In the rainy season the plant is in fine condition, but at this season it is almost impossible to dry the stems in quantit

without injuring the fibre, unless recourse is had to artificial means of desiccation, which greatly increase the cost of the material. It is therefore obvious that the attention of inventors should be given to the discovery of a process for the treatment of the green stems."

Result.

The trials commenced in September, 1879, at Sahâranpur, and ten competitors entered machines of different kinds, of which three were withdrawn. The following is an abstract of tho results :—

Competitor.	Green stems worked up.				Total fibre obtained.	Percentage of fibre.	Cost per ton.		
	Tons	qrs.	cwt.	℔.	℔.		Rs.	a.	p.
M. Z. P. Vander Ploeg ...	1	14	0	0	118½	3·11	367	8	0
Dr. Collyer	1	0	0	0	147	6·60	112	0	0
Paris machine		...			104	...	483	14	0
M. Nagona	3	7	3	0	337½	4·44	38	14	4
Mr. Cameron	1	2	3	0	$92\frac{3}{16}$	3·61	270	12	0
Mr. Amery	1	10	0	0	$107\frac{15}{16}$	3·21	418	0	0
Mr. Blechynden	0	11	1	0	58½	4·68	251	4	6

The judging committee consider that the limit of £15 per ton for the cost of preparation and laying down the fibre at a port of shipment in India would render competition practically impossible from a place so distant from the sea-board as Sahâranpur. Further, that the plant grown at Sahâranpur is not calculated to give such good results as that grown in more suitable localities, but that, on the whole, the experiments made during the trials, though not decisive, have gone far towards establishing the conditions under which a fair verdict can be awarded and have advanced an important step in the progress made towards the solution of the problem. The awards have not yet been published, as they depended on the valuation of the fibre in the English market. The advance made in this competition shows that the invention of a successful machine is merely a question of time and justifies the resolution of Government to continue the supply of rheea stems for experimental purposes.

Cultivation and prospects.

The Dutch botanist Blume, in his report on the cultivation of rheea in Java and Sumatra, states that "the plant thrives best in shade, in a moist and fertile soil : conditions such as are usually found in abandoned coffee plantations. * * The plant thrives best in the hilly parts of the country in which rain is frequent. In the plains it would require irrigation." The conditions under which the plant flourishes in the countries best adapted to its growth are a moist tropical atmosphere, a shady situation and a low-lying alluvial soil. These conditions do not exist in Sahâranpur. In the cold season, so soon as the temperature falls to about 40°F., the whole crop, leaves and stems, become black and fall to the ground. The roots then remain dormant until January, when the fields become green again with the young shoots. As the weather becomes warmer, the plants require irrigation at regular intervals of time, and weeds must be removed until the plants are strong enough to keep them down. The stems also are very short, owing to the effect of the hot dry winds which prevail in these provinces, and they ripen irregularly from the same cause, the tops being often green and soft, whilst the lower portions are ripe and hard. Until the meeting of the competitors in 1879 it was not known how inferior the Sahâranpur stems were when compared with those raised in more suitable climates. During this trial, stems grown in Dehra and Calcutta were found to give better results than the local produce, presumably owing to their having been raised in a moister climate. A healthy stem is described as an evenly shaped flexible wand of a length varying from 5-7 feet with the same colour throughout and ripening in all parts simultaneously. The Sahâranpur stem was generally an irregularly shaped stick, 3-5 feet high, of uneven growth, with irregular distances between the joints. Many of the stems were stunted and imperfectly nourished and unequally ripened. The conclusion arrived at by the committee was that either the cultivation was insufficient or the climate is unsuitable. Experiments are now being made to ascertain whether trenching and heavy manuring will correct the defects observed, but it is believed that, as with most plants, climate is the first consideration, and therefore rheea cultivation in the drier parts of these provinces can never be more than partially successful. There is no difficulty in raising the plant from seed or in propagating it by cuttings. Dr. Jameson has estimated that an acre will yield four crops in the year, aggregating ten tons of green stems. Taking the yield of fibre at one-twentieth of the green stem, the return of marketable fibre per acre will be half a ton. The value of rheea-fibre in the English market at present is from £40 to £60 per ton, according to quality, a price that should always leave a fair margin of profit to the cultivator of the plant and the preparer of the fibre.

CINCHONA.

For several consecutive years previous to 1872, experiments were undertaken in the valleys and hills of these provinces for the cultivation of the cinchona plant. It was tried at Chandwála and other localities in the Dehra Dún at 2,500 feet, at Chhajauri in Garhwál at an altitude of 4,500 feet, and at Mussooree at an altitude of 6,500 feet. In Kumaun, experiments were made in the Bhábar at 2,000 feet, at Háwalbágh at 4,500 feet, at Ayár-Toli and Ránikhet at 6,000 feet, and at Arkalli at 6-7,000 feet. In all these places, except the Bhábar, the plants progressed during the hot weather and rains. It was considered necessary to protect the young trees from the frost during the cold weather, and this was done for three years and until many of the plants had attained a height of 4-6 feet. These, with many others ranging 2-3 feet, were then left uncovered during the cold weather, with the result that every one of them perished in all the localities mentioned. Similar attempts proved unsuccessful in the Kangra Valley and Panjáb Himálaya. In Kangra, where many of the plants had reached 4-5 feet in height, a single winter's frost was found enough to destroy them, and at Ránikhet, plants of *C. succirubra*, 4-5 feet in height, were cut down by the frost, though partially protected. Dr. Jameson closes his account[1] of these operations with the following remarks :—"To continue the growth of the plant as an experiment in view to the cultivation for economic purposes would be a mistake, and the time therefore has come to close the experiment which has been carried on with the utmost labour, care, and attention, and to declare that the valleys and hills of the Himálaya of the North-Western Provinces and the Panjáb are not fitted for the cultivation of the cinchona plant."

TALLOW TREE.

Stillingia sebifera, Michx.—Tallow-tree.

A tree belonging to the natural order *Euphorbiaceæ,* introduced from China. This tree fruits abundantly in all climates in India from Calcutta to the Himálaya. There are large plantations in Sahárańpur, the Dún, and on the several tea-plantations in Kumaun. The seeds were sown in the Sahéranpur gardens in 1858, and so rapid was their growth that, in 1866, they measured 6 feet in circumference 3 feet from the ground. Plantations were established in the Dehra Dún, at 4-5,000 feet in the hills at Hawalbágh, Ayár Toli, and Páori, and in all these places there was an abundant yield of fruit. The seeds lie within a capsule and are enveloped in a fatty matter which yields a tallow. Animal tallow consists of stearine and elaine, both of which are found in nearly a pure state in these seeds. The mode of extracting[1] the tallow is very simple. It is merely necessary to boil the seeds and strain through cloth into water; and to purify the tallow, boil again in water and strain through a cloth as before. For burning purposes the tallow is excellent, as it gives a clear, bright, inodorous flame without smoke. It has also been tried with some success as a lubricator for railway wagons. The wood is close-grained and yields a timber well fitted for printing-blocks, and the leaves afford a dye. It was thought, at one time, that the cultivation of this tree in Kumaun would yield results second only to tea, but actual experiment has shown that the labour and expense involved in collecting the seeds and extracting the tallow are far in excess of the value of the product; and in Calcutta, where it was introduced over thirty years ago, the result has been the same.

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[1] Sel. Rec., N.-W. P. (2nd Ser.), VI., 602, and Dick's Report, *ibid.*, I., 79.

IPECACUANHA.

Cephœlis Ipecacuanha.—In 1870, Dr. Jameson procured two plants at the Kew Gardens and brought them out to India, where they arrived safely and were planted in the gardens at Chandwála in the Dehra Dún, but ultimately perished from frost.

CORK OAK.

Quercus suber, Linn.—Cork oak. Brandis, 485.

At various times seeds of the Italian and Spanish cork oak have been planted in Dehra Dún and have germinated freely. The young trees thrive well and may, hereafter, prove of value, but the ultimate success of the experiment has yet to be seen.

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[1] For Dr. Macgowan's description of the process of manufacture in China, see J. Agri.-Hort., Ben., VII., 164.

SWEET CHESTNUT.

Castanea vulgaris, Linn.; *C. vesca*, Gærtn.—Sweet chestnut, Spanish chestnut, châtaignier. Brandis, 491.

The seeds of this tree were introduced by Sir John Strachey, and subsequently consignments were received by the Superintendent of the Botanical Gardens, Sahâranpur, by whom they were planted and the young trees distributed all over the Dún and Kumaun. The chestnut yields freely in the Dúns and Lower Himâlaya, and now forms an appreciable addition to the fruit resources of the Dehra bazar. In Italy, Greece, Central France, Spain, and Corsica, it forms an important article of food for the inhabitants of the mountainous regions of those countries, and from the success of the experiments tried here, it appears that the establishment of the chestnut in suitable localities in these hills presents no difficulties that cannot be easily surmounted.

CAROB.

Ceratonia Siliqua, Linn.—Carob or St. John's bread-fruit tree: the Algaroba beans of commerce (fruit). Brandis, 166.

The carob was introduced by Dr. Jameson from Malta in 1861, and by 1863 it was extensively propagated and distributed in the Dún. The trees, though they flourish well, do not seem to give pods in such quantities as they yield in Malta and Italy. In 1866, the same report was received, and in 1880, it has been decided to try to improve the quality of the seeds by grafting, which, in Italy, not only produces better fruit, but gives a yield in a much shorter space of time. The trees appear to be unaffected by any extremes of temperature or excessive moisture. The sweet nutritious pulp of the pods is ground and mixed with grain and then baked and eaten by the poorer classes in Italy, the Levant, and Malta. The pods are also given to draught cattle in the proportion of one measure of carob beans to two measures of barley, and on this food they both work and thrive well. This tree is indigenous in Spain, Algeria, the eastern part of the Mediterranean region, and Syria.

MEZQUIT.

Prosopis glandulosa—The Mezquit bean.

This plant, a native of Texas, was introduced in 1878, and has been successfully propagated in Kumaun. It produces pods freely during the rains, not all at once, but in succession, and seems to stand the extremes of heat, cold, and moisture very well. The beans are used as fodder for cattle. *Acacia tortuosa*, a native of Jamaica, has recently been introduced. It yields a fodder pod and might be cultivated as a hedge as well. It thrives well at Sahāranpur. The *Euchlæna* (*Reana*) *luxurians*, which yields a good fodder grass, is also under trial in the Government gardens, as well as a series of Australian grasses. The *Pithecolobium Saman*, or 'rain tree,' has been found a failure, not being able to withstand the frosts in the cold weather. Several experimental sowings of fibre plants have also been made. Dr. Jameson recommended the cultivation of *Agave Cantala* and *americana*, *Aloe angustifolia* and *intermedia*, *Sanseveria zeylanica* and *Tacca stricta*. A recent report on *Malachra capitata* shows that it grows to a fair height and seeds freely, producing a fibre, however, in no way superior to the indigenous *patsan* (*Hibiscus cannabinus*), but useful for mixing with jute in the manufacture of bags. Some forty species of *Eucalyptus* have been cultivated. All seem to thrive fairly, and some of them remarkably well in Sahāranpur and the hills. *Catalpa speciosa*, Engel., a tree indigenous to North America, yields a timber especially adapted for underground work, such as posts, sleepers, and the like, and is now under cultivation in Sahāranpur, and will also be tried in Mussooree. Olives have been received from Florence and are now planted out at Chajauri, where they appear to thrive well, the climate and soil being very suitable. They are of the same species as that from which the famous Lucca oil is extracted. A considerable number of seedlings of the oil-plant, *Lallemantia iberica*, raised in Sahāranpur have been planted at Mussooree, but it will take some time before a correct estimate of its value can be obtained. Madden records that hops were raised with some success in Hawalbágh in Kumaun over thirty years ago, and experiments in the Dún in 1862-63 showed that they grow well there also. In the plains, however, the flowers do not seem ever likely to be useful for brewing purposes. Hops grow well at Sahāranpur, and during the rains become most luxuriant; but it also happens that the flowers are produced at that time and the heavy rain prevents their proper development. This would appear to be a matter that should affect the culture of the hop plant in this country wherever the periodical rains are felt, and would apply to the whole of the Himálaya of these provinces equally with the plains. In conclusion, mention may be made that fruit trees of all kinds, vegetables, flowers, and ornamental shrubs, have been introduced and propagated and distributed all over the hills from the Tons to the Sárda, and that for this purpose the gardens at Mussooree, Chajauri and Ránikhet have well fulfilled the object for which they were established.

TEA.[1]

Tea.

The history of the cultivation and manufacture of tea in the hill districts of the North-Western provinces having originated simultaneously with the introduction of the plant in India generally, and with its discovery as an indigenous plant in Asám, it will be advisable to commence with a brief sketch of the circumstances which have led to the undoubted success of tea culture in these provinces.

History.

The claim of first originating the idea of cultivating the tea plant in India is variously attributed. As early as 1788 it appears that Sir Joseph Banks, at the request of the East India House, wrote a memoir on the subject,[2] recommending the introduction of plants from China to Behar, Rungpur, and Kuch Behar. Some years afterwards considerable interest was aroused by the reported discoveries of indigenous tea plants in Burma, Asám, Nepál, Kumaun, and Basáhr. It was in Asám only, however, that the discovery of the truly indigenous plant was confirmed. Mr. Burrell is inclined to believe that the discoverer of the wild tea plant in Asám was Mr. David Scott, an Indian civilian, who, when Asám was ceded to us, took charge of the settlement of that province. It appears that some time between 1819 and 1821 he sent a specimen of the Asám wild tea plant to Calcutta to his friend Mr. James Kyd, whose father, Colonel Kyd, corresponded with Sir Joseph Banks about tea cultivation in India amongst other matters. This specimen was handed over to Dr. Wallich, and Mr. Burrell has succeeded in identifying it in the Wallichian herbarium now belonging to the Linnean Society. Attached to the specimen he found a portion of Mr. Scott's letter, but without any indication as to the date. The conclusions arrived at by Mr. Burrell are fully borne out by Mr. Thiselton Dyer, who, being the author of a monograph on the Indian *Ternstrœmiaceæ*, must have made a special study of this subject; also by the late Dr. Anderson and Dr. McClelland. In a letter from the latter to Mr. Clerk Marsham the following passage occurs:—

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[1] I am indebted to Mr J F Duthie, Superintendent of the Botanical Gardens, N.-W. P., for this notice of the tea industry in Kumaun

[2] See an interesting paper read by Mr. A. Burrell before the Society of Arts on February 2nd, 1877, and published in the Society's Journal, Vol. XXV., p. 199.

> "The circumstances brought to light by Mr. Burrell coincide exactly with what I have always understood to be the fact, that specimens of the plant and seeds of the indigenous tea plant had been sent by Mr. Scott through Mr. Kyd to Dr. Wallich as early at least as 1821."

And further on he remark:—

> "Had Mr. Scott's discovery in 1821 been taken up in an active and enlightened spirit, several years might have been gained, but public spirit was not prepared at that period for much enterprise, and we were content to receive our teas from China. Besides, Mr. Scott had not at that time reduced the tribes on the frontier to subjection, and their troublesome character was kept alive by our war with Burma, and, above all, we wanted Lord William Bentinck, without whom the second discovery of the tea plant might have shared the fate of the first. What we have most to regret is that Mr. Scott's discovery was not properly recorded, when steps might have been taken, with his assistance, for the transmission of seeds and plants to the Botanic Garden in Calcutta, where the tea plant could have been propagated twelve years before its subsequent discovery in Asám."

Other writers on the early history of Indian tea have mentioned Mr. Bruce as having first discovered the true tea plant in Asám, but as his discovery was only made in 1823, his claim must give way to that of Scott.

The Kumaun plant noticed by Bishop Heber on his visit to Almora in December, 1824, as well as that of Basáhr, described by Moorcroft in 1821, must be referred to an evergreen shrub called *Osyris nepalensis* and belonging to the sandal-wood family. Bishop Heber thus writes concerning this plant. "The tea plant[1] grows wild all through Kumaun, but cannot be made use of, from an emetic quality it possesses. This might, perhaps, be removed by cultivation, but the experiment has never been tried. For the cultivation of tea I apprehend both the soil, hilly surface, and climate of Kumaun, in all which it resembles the tea provinces of China, are extremely favourable." The plant observed in Nepál was a true tea plant in cultivation, and which Dr. Wallich afterwards ascertained to have been brought from Pekin on the occasion of one of the triennial embassies sent to China by the Gorkháli government.

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[1] Regarding the same plant Dr. Royle in his "Illustration of the Botany of the Himálaya Mountain," p. 322, says:—"The leaves of this plant are in Kumaun employed as a substitute for tea: hence some travellers have been led into the error of stating that the true tea plant was to be found in this part of the mountains."

Tea cultivation in the Himálaya.

The idea of cultivating tea in the hill districts of Northern India was first originated by Dr. Royle in 1827, who was at that time in charge of the East India Company's Garden at Sahàranpur. In a report to the Government of India, at the close of that year, he pointed out the resemblance of the Himálayan vegetation with that of tea-producing districts of China, as well as the suitability of the soil, especially in Kumaun. Four years later he again expressed these opinions[1] to the Governor-General, Lord W. Bentinck, during the visit of the latter to Sahàranpur. The representations of Dr. Royle from Sahàranpur, and of Dr. Wallich at Calcutta, and of other writers, eventually led in 1834 to the formation by Lord W. Bentinck of the Tea Committee. The chief object of this committee was to ascertain the best mode of introducing the Chinese tea plant into India, and of its cultivation in carefully selected localities. One of the first acts of the committee was the deputation of Mr. G. J. Gordon to China in order to arrange as to the best modes of obtaining both the genuine plant as well as Chinese cultivators. In the meantime, arrangements were being made to select the best localities in India for sowing the seeds which were expected to arrive before the end of the year (1834). At the same time a set of queries was circulated by the committee for the purpose of obtaining the opinions of those who were most competent to give their advice on this matter. Two important communications were received in reply—one from Captain Jenkins, Agent to the Governor-General in Asám; and the second from Dr. Hugh Falconer, who had recently succeeded Dr. Royle as Superintendent of the Sahàranpur garden. After describing the conditions under which the tea plant was being cultivated in China, and the attempts which had been made to introduce the plant to other countries, he observes :—

> "There is, perhaps, no part of the Company's territories in India which supplies all the conditions of tea districts in China in respect of climate; but there are situations which approach it so nearly as strongly to bear out the

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[1] See also his "Ill. Him.," pp. 124-27, where these views are more fully s at l.

> conclusion that tea may be so successfully produced in this country as to be an object of high commercial importance * * * * * It has been seen that the annual heat of the southern limit of the tea cultivation in China, assumed to extend to Canton, is 73° F. At Sahâranpur, which may be considered as at the northern limit nearly of the plains of Hindustan, 8° of latitude higher, and 1,000 feet above the sea, the mean temperature of the year is 73° F.; the temperature of June is 90°, and of January, 52°.
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> "In the Himálaya mountains this case is widely different, excepting periodical rains; here all the conditions of the temperate climate are found, and here, above all parts of India, we may look for successful cultivation of tea."

After describing the geological features of these mountains, having made a special study of the subject, he summarizes his opinions as follows:—

1. "That the tea plant may be successfully cultivated in India.

2. "That this can be expected nowhere in the plains from 30° north down to Calcutta.

3. "That in the Himálaya mountains near the parallel of 30°N., notwithstanding some circumstances of soil and moisture of climate, the tea plant may be cultivated with great prospect of success; that a climate here may be found similar in respect of temperature to the tea countries in China; that in the direction and great slope of the hills, the absence of table-land or elevated valleys, and the contracted figure of the existing valleys, are the chief difficulties in the way of cultivation, which may prevent tea from being produced in great quantity on any one spot.

4. "That the most favourable ground for a trial is a tract on the outer ridges, extending from 3,000 feet above the sea, or the point where the hot wind ceases, up to the limit of winter snow.

5. "That in the valley of the Dhoon, if not the better, the inferior sorts of tea might be produced."

The opinions expressed by Dr. Falconer in the above letter are remarkably similar to those of Dr. Royle submitted from England about the same time; and, as the latter declared, "without any communication of ideas, for the two essays must have crossed each other at sea." Among the localities recommended by Dr. Royle were Bhim Tál, Háwalbágh, Dehra, and Pinjor in valleys from 2-2,500 feet in elevation above the sea; also Almora, Jerrapani, Nahan, and Subáthu at elevations of 4 to 5,000 feet; also Mussoorie at 6,500 feet.

Dr. Falconer.

Shortly after this Dr. Falconer received orders to examine the hill country situated between the Jumna and the Ganges for the purpose of selecting suitable sites for tea nurseries. In view also of the experiments that were to be undertaken in Kumaun, a letter was addressed to Mr. G. W. Traill, Commissioner of that province, by Dr. Wallich, Officiating Secretary to the Tea Committee, dated 28th June, 1834, requesting him to render what assistance he could in order to carry into effect the object in question. In Mr. Traill the Government found an officer well qualified to undertake this work. He was assisted by Mr. R. Blinkworth, who was then at Almora acting as plant-collector under Dr. Wallich for the Calcutta Botanical Garden. Two sites were chosen for nurseries in which to sow the seeds that were shortly expected from China. They were—Lachhmesar near Almora and Bhartpur near Bhím Tál. They are thus described by Mr. J. H. Batten, B.C.S., who was afterwards Commissioner of this province,[1]—"the former occupying three acres of old and easily acquired crown land on the north-west slope of the hill below the capital town at 5,000 feet above the sea, the latter occupying four acres at 4,500 feet above the sea in the near neighbourhood of the Bhím Tál lake, which is situated on the first step of the mountains above the Bhamauri Pass." It was in this same year (1834) that through the energetic researches of Captain Jenkins and Lieutenant Charlton some specimens of the true tea plant of Asám were obtained, and thus confirmation was secured as to its being really wild in that country.

Sites.

The question of selecting sites gave rise to much discussion; some, such as McClelland, Griffith, &c., being in favour of restricting cultivation to Asám, or to countries with a similar climate, on the assumption that a damp and equable climate was necessary for its proper growth. As far as the Asám plant was concerned, this has been proved to be good advice, and results have shown that though the Asám tea plant is botanically the same species as that of China,[2] it is not sufficiently hardy to bear the extremes of temperature to which the Chinese variety is exposed in the tea gardens of North-

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[1] "Notes and recollections of tea cultivation in Kumaun and Garhwál," by J. H. Batten, B.C.S., retired, Journal, Agri.-Hort. Society of India, Vol. V., Part IV., p. 53, 1878.

[2] See F. Ind., i., p. 292.

Western India. In China itself, where the area of tea cultivation extends over nearly twenty degrees of latitude, there must be many degrees of hardiness in the plants which are grown throughout this wide extent of country.

Tea-plant discovered in Asám.

Previous to the rediscovery of the tea-plant in Asám, the sites recommended for cultivation in India had reference solely to the Chinese plant, as far as was known about it at that time. In most cases these sites have proved successful so long as cultivation was restricted to the Chinese variety, or with hybrids only slightly crossed with that of Asám. The pure Asám plant, on the other hand, requires a hot and moist climate; in fact the more unhealthy the locality may be from the above cause, the greater the chances of success. The discovery of the true tea-plant in Asám naturally gave rise to a considerable amount of partiality in favour of restricting the cultivation of tea entirely to that country or its neighbourhood; and consequently attention was diverted from the more distant nurseries in Kumaun and Garhwál. These nurseries, however, were in good hands, and, in spite of all drawbacks, the success of the experiments soon became evident. At this point, it will be advisable to confine attention to matters more immediately connected with the subject of this notice, *viz.*, the progress of tea cultivation in Kumaun and Garhwál.

Cultivation in Kumaun.

The first batch of plants numbering about 20,000 were despatched from Calcutta in 1835, but very few of these arrived at their destinations alive; and of the seeds sent to Dr. Falconer not one germinated, a fact not to be much wondered at, considering the length of the journey they had to undergo, and the short-lived nature of the seed. The plants flourished in the two Kumaun nurseries and produced abundant crops of seed. In the Saháranpur garden plants were also to be seen, the offspring of seed produced at Koth in Tihri-Garhwál. In 1841, Dr. Falconer, who was then in charge of all the tea plantations in Northern India, visited the two Kumaun gardens. At the Bhartpur nursery he found 1,344 plants. Of these, 291 were original plants introduced in 1835; 153 were seedlings of 1840, and the remainder were from layers made in this and the two preceding years. At Lachhmesar there were 3,840 plants; *viz.*, 250 of the original plants of 1835, 2,072 seedlings of 1839 and

1840, and the rest layers. The greater success of the latter garden he attributed partly to its better site, but in a great measure to Mr. Blinkworth, who happened to be residing in the neighbourhood. On the whole, he considered the results up to this time as most encouraging. Shortly after this he paid a visit to the Garhwál nurseries and reported similar progress. As far, therefore, as the plants were concerned, everything looked promising; but nothing was known as to the quality of the leaves for the manufacture of good tea. At that time there was very little practical knowledge in India regarding the various processes of tea manufacture, and in order to avoid unfavourable opinions at the outset through the attempts of unskilled workmen, Dr. Falconer strongly recommended that two complete sets of Chinese tea manufacturers should be supplied for the nurseries in Kumaun and Garhwál, especial care being taken that these men should be of the best description.

Chinese labour imported.

A small manufacturing establishment was accordingly sanctioned by Government. Some men who were selected for this work by the Commissioner of Asám declined to go to Kumaun. Dr. Wallich, however, succeeded in engaging the services of a party of Chinese artizans in Calcutta. These were accordingly sent up to Kumaun, together with a set of implements all under the charge of. Mr. Milner, who happened to be on his way to Sahâranpur to take up his duties there as Head Gardener. They arrived at their destination in April, 1842. The Chinamen, as soon as they saw the Kumaun tea bushes, all declared that it was the genuine China plant; and, in their opinion, far superior to that of Asám. They recommended that the plants should be pruned down close to the ground, so as to encourage the production of a fine crop of young leaves in the succeeding spring. They managed to make a small quantity of tea with the leaves of that year, a sample of which was taken to England by Dr. Falconer a few months afterwards. This sample was submitted to the celebrated tea-brokers Messrs. Ewart, Maccaughly, and Delafosse in London in September, 1843, and they reported as follows :—"The tea brought by Dr. Falconer as a specimen of the growth of the China plant in the Himálaya mountains resembles most nearly the description occasionally imported from China under the name of *Oolong*. This resemblance is observable in the appearance of the leaf before and after infusion. The colour of the liquor is also similar, being paler, and more of the straw colour than the general description of black tea. It is not so high flavoured as the fine *Oolong* tea, with which we have compared it, and it has been too highly burnt in the preparation, but it is of a delicate, fine flavour, and would command a ready sale here."

Dr. Jameson.

After the departure of Dr. Falconer, the Saháranpur garden was put under the charge of Dr. W. Jameson, whose energy and indomitable perseverance contributed mainly to the success of tea cultivation in Northern India. He was also an active witness of the progress of tea cultivation from its experimental stage to the period when its profitable cultivation justified the Government in handing it over to private enterprise. A sample of probably the same tea as that of Dr. Falconer above referred to was sent by Dr. Jameson to the Calcutta Chamber of Commerce, where it was pronounced to be a tea of very good marketable value, and worth in London about 2*s*. 6*d*. per pound. Another portion of this sample sent to London was reported on by Messrs. Thomson of Mincing Lane, and pronounced to be of "the *Oolong Souchong* kind, fine-flavoured and strong. This is equal to the superior black tea generally sent as presents, and better, for the most part, than the China tea imported for mercantile purposes." Dr. Jameson visited the Kumaun plantations in April, 1843, and found them in a very satisfactory state. The Chinamen were manufacturing a different kind of tea which appeared to be far superior in quality. Some samples of the above contained in sixteen small canisters were despatched in August to the India House. The flavour of this tea was somewhat spoilt by the wax-cloth in which the canisters were wrapped. In other respects, however, the reports were most satisfactory.

1844.

The history of the progress of the various tea plantations in North-Western India from this period, *i.e.*, from the year 1844 until a few years ago, when the last of the Government gardens passed into private hands, is chiefly to be gathered from Dr. Jameson's annual reports to Government, some of which have been published in the Journal of the

Agri-Horticultural Society of India.[1] In his report, dated 28th February, 1844, he gives a full account of the Kumaun nurseries, their number and extent, as well as the number of plants contained in each; he also enters into some particulars regarding the mode of manufacturing the tea. There were at this time five separate nurseries scattered over four districts; their total area amounted to 55 acres, and they contained 4,306 tea-bearing plants. More land being required, new nurseries were marked out by Dr. Jameson, and some of the old ones were extended, making in all an addition of 66 acres. Dr. Jameson's intimate knowledge of geology enabled him to select these new sites with great advantage. The total quantity of tea manufactured in 1843 was 191℔. In discussing the future prospects of tea, Dr. Jameson clearly shows the success of the experiment so far, and urges the necessity of greatly extending the cultivation of tea in the provinces of Kumaun and Garhwál. He says:—

> "The plants now amount to 150,000, and these will be doubled, I trust, or trebled annually; and were there only seed in sufficient numbers, as they germinate most freely, provided they are fresh, the aspect of the nurseries in an infinitely short space of time would be changed; for instead of patches there would soon be districts covered with tea plants * * * * *
> The nursery at Kaulagir in the Dehra Dún contains about 4,500, and here the plants are thriving as well as in any other of the nurseries.. It is, however, to be proved whether the leaves yielded by the plants in this locality are fitted for making tea of a superior quality, as it has been ascertained that all the tea grown in China at low elevations is of an inferior description. If, however, it does prove to be a marketable article, and equal to that produced in the neighbourhood of Canton, a vast field for enterprise will be opened up, whether Government considered it worthy of their own attention, or it be brought about by private capital. Water carriage will soon, it is hoped, be within two or three marches of this valley, which will also be a strong inducement, in addition to the above, to make capitalists invest their capital in this channel, and thus we trust ere long to see the hill provinces, which at present yield but a trifling sum to the revenues of the State, become as important, in an economical point of view, as any of those in the plains of Hindustan."

In a letter to Dr. Royle dated 1st July, 1844, Dr. Jameson after having made an inspection of all the nurseries writes:—"At Koth, Ráma Serai, and Gadoli in the Garhwál Hills, the tea plants are thriving admirably, many of them being nearly six feet high." In a later letter he informs Dr. Royle that the Chinese manufacturers denied that green and black tea were made from different plants, and that it was only a difference in the mode of manufacture. In another letter he mentioned that 436lb. of tea had been made, and that three acres yielded 162lb. of tea; that he had then 120 acres under cultivation, and hoped soon to have double this area.

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[1] See Vol. II., p. 323; Vol. IV., p. 173; and Vol. VI., p. 81. For the first few years Dr. Jameson corresponded regularly with Dr. Royle, and the substance of his letters is contained in a paper by the latter published in the Journal of the Agri.-Hort. Soc., Vol. VII., part II., p. 11.

1845.

In Dr. Jameson's next report, published in 1845, he gave a detailed account of the progress made during the preceding year at the several gardens in Kumaun and Garhwál. Seventy-six acres of land were added and 94,100 plants were put into them. In September and November upward of four lacs of seeds had been sown, of which 167,000 germinated and were still germinating. Three hundred and seventy-five pounds of tea were manufactured, showing an increase of 185 lb. on the preceding year; and as the plants were still young, Dr. Jameson was confident of a steadily increasing quantity per acre every year. In this report he entered into the subject of cost and profit, and shows by the following estimate the amount of profit that might be realized from 6,000 acres of tea, on the assumption that an acre was capable of yielding one maund of tea :—

	Rs.
The expenses of cultivating 6,000 acres	87,000
Ditto of making the tea	39,975
Ditto of packing the tea	2,259
Land rent, carriage to Calcutta, &c.	36,500
Total ...	1,29,734
To value of 6,000 maunds of tea or 240,000 seers at Rs. 2 per seer	4,80 000
Or say that the tea sold at Re. 1-8 per seer	3,60,000
Expenditure	1,29.734
Balance	2,30,266

Garhwál.

Regarding the Garhwál nurseries, Dr. Jameson reports that that of Kaulagir in the Dehra Dún consisted of six acres and contained 8,000 plants. At Koth in the Bhaddri valley, elevation 5,000 feet, there were 729 plants; and in the Ráma Serai nursery, elevation about the same, 728 plants. About a quarter of the total number in the two latter nurseries were a portion of the plants which came originally from Calcutta. Another nursery at Gadoli near Páori, established by

Dr. Jameson in 1843, contained 5,000 plants. Shortly after this Dr. Jameson sent a sample of Dehra Dún tea to Dr. Royle for an opinion, which was favoured by Mr. R. Twining, who reported as follows:—"I have carefully tasted your sample of Himálayan tea, and I really think it a promising specimen. The flavour is not strong, but it is delicate and pleasant, and a little, methought, of the *Orange Pekoe* character. The complexion of the leaf is rather good, and pains seem to have been taken in the manipulation." This favourable account was very gratifying to Dr. Jameson, who at once foresaw the profit that would result by extending tea cultivation throughout the Dún. Other samples were submitted through the Court of Directors for professional examination in London, and the reports, on the whole, were most satisfactory. Dr. Jameson received about this time from the Court of Directors grateful acknowledgment for the good work already done by him. The sales of tea at Almora, two of which had lately been held, showed an increasing appreciation of Indian tea by natives as well as by Europeans. The average price offered for black tea was seven rupees per seer. In 1847, Dr. Jameson wrote to Dr. Royle:—"The tea this year will, I think, be very superior to anything yet made, as it has been manufactured and packed under advantages which were not procurable until now; that is, there is now a sheet-lead maker attached to the manufactory." Another sale was held this year at Páori. The amount realized for green tea varied from Rs. 10-8-0 to Rs. 9-4-0, and black from Rs. 7-8-0 to Rs. 4 per seer. About this time, Dr. Jameson received orders to select sites for new plantations in the hilly districts between the Satlaj and the Ravi, which resulted in the establishment of the Kangra valley nurseries.

Third report.

Dr. Jameson's third report[1] gives further details regarding the condition of the different nurseries. His observations as to soil were to the effect that the tea plant thrives well both in stiff and free soils, but apparently better in the latter, or in a mixture of the two; with regard to elevation, that it thrives equally well at heights ranging from 2,200 feet above the sea to 6,000 feet. The area under cultivation at this time was 162½ acres, and the minimum yield of tea per acre was 80lb. It is also stated in this report that about half the quantity of the '*Pouchong*' (black tea) was bought up by natives at an average price of Rs. 6-8-8 per seer. The coarse *Bohea* tea was sold to the Bhotiyas at from Rs. 2 to Rs. 2-4-0 per seer for export to Tibet, where it successfully competed with the tea imported to that country from China. Other interesting matters are discussed by Dr. Jameson in this report, but space will not permit to give more than the headings of these subjects :—

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[1] J., Agri-Hor., Cal., VI, pt. ii.

1. On the method of preparing ground prior to forming a plantation, *viz*, fencing, draining, ploughing, trenching, &c.
2. On seeds when ripe, the season of ripening, and the methods to be adopted to ascertain it.
3. On the method of sowing seeds and season, and on the treatment of the young tea plants after they have germinated.
4. Method of rearing plantations, by sowing seeds, by layers, and by cuttings.
5. On the method of transplanting, and the season.
6. On pruning, best season and mode.
7. On irrigation.
8. On the tea plant ; season of flowering ; its character and species ; and on the advantages to be derived from importing seeds from China.
9. Method and season for plucking and gathering leaves.
10. On the method of manufacturing black tea.
11. On the method of manufacturing green tea.
12. Packing tea.
13. Manufacture of sheet-lead
14. Tea manufacture.
15. Implements required in manufacturing tea.

In a letter to Dr. Royle, dated 25th January, 1849, Dr. Jameson states that 2,656lb. of tea had been manufactured in the previous season, of which 600lb. (black and green) had been sent to England, that there would be 400 acres under cultivation at Kaulagir by the end of the season, and at Páori he expected to have 2-3,000 acres. One hundred thousand plants were sent to the Kangra valley, and he hoped in the course of eight or ten years to have a sufficient number of plants in the Kaulagir plantation to plant the whole of the Dún.

Mr. Fortune.

In 1848, the services of Mr. Robert Fortune, already well known as a horticulturist, were engaged by the Court of Directors to make an expedition to the northern part of China in order to obtain plants of hardier varieties, as well as to investigate the mode of manufacture in that part of China. In all this he was completely successful. About 8,000 plants and several packets of seeds were despatched by him to India from localities celebrated for the good quality of their tea. He returned in 1851, bringing with him 12,000 more plants, together with a large quantity of seed in a germinating state. With these he proceeded at once to the Himálayan nurseries, which he afterwards inspected officially by request of Government. In his report on the condition of the nurseries he mentions eight as being at this time under Government control, *viz.*, one in Dehra Dún, one in Garhwál, and six in Kumaun. Their names are :—Kaulagir (Dehra Dún) : Gadoli (Garhwál) : Hawalbágh, Lachhmesar, Kapena, Anu, Kuasar, Bhartpur, and Rasiya (Kumaun).

Some remarks of his on each of the above may be briefly given here :—

1. *Kaulagir plantation.*—The soil is composed of clay, sand, and vegetable matter, on a gravelly subsoil of rocks similar to the surrounding mountains. The plants appeared less healthy than in good Chinese plantations owing (according to Mr. Fortune) to—
    (*a*) The flatness of the land : (*b*), the system of irrigation : (*c*), too early plucking : (*d*), hot drying winds.
2. *Gadoli.*—Soil composed of loam, sand, and vegetable matter, very suitable for tea. Very like a Chinese plantation ; plants healthy and prospects good.
3. *Háwalbágh.*—Land undulating similar to Chinese tea country ; soil a sandy loam mixed with vegetable matter ; land terraced and sloped. Terrace cultivation is not adopted in China.
4. *Lachhmesar* and *Kapena.*—Situation steep ; soil light and sandy, rarely irrigated ; plants in good order.
5. *Bhím Tál.*—(*a*) Anu and Kuasar : land low and flat, area 46 acres ; bad situation : (*b*) Bhartpur : 4½ acres of terraced land ; soil, light loam mixed with clay, slate, and trap rock and a small amount of vegetable matter ; well adapted for tea : (*c*) Rasiya; 75 acres of sloping land, plants most healthy, which are not irrigated.

Mr. Fortune also visited two plantations belonging to zamíndars, the first called Lohba in Eastern Garhwál, 50 miles west of Almora, and at 5,000 feet altitude; excellent land. In 1844, 4,000 plants from the Government plantations were put here, but failed owing either to want of knowledge or intentional carelessness. The other plantation called Katyúr was situated near Baijnáth in Western Kumaun; the ground was undulating; there were numerous streams, and the soil was fertile. Captain (now General Sir H.) Ramsay's two plantations each of four acres were planted in 1850. Good management produced good results. The labour and manure of the two neighbouring villages were secured in lieu of taxes. At the close of his report Mr. Fortune gives some advice on certain points connected with tea cultivation in this part of India: (1) The land best suited for tea, he considered, should be undulating and well drained, and such as would produce good crops of *mandua* or wheat, moist but not stagnant. (2) Irrigation he declared to be generally injurious and should be resorted to only on emergencies. (3) Plucking in China was never carried on until the third or fourth year after planting, and was only necessary up to this time for forming good bushes; sickly plants should not be plucked. (4) The most suitable climate was to be found in Eastern Garhwál and Kumaon. At Háwalbágh, the thermometric readings showed a great similarity of climate with that of China. The rainy season in China is earlier, and the hottest time is in July and August, whereas in India the hottest month is June.

Outturn.

In appendix B. the annual yield of manufactured tea for each garden (between 1848 and 1868-69) is given as far as could be ascertained from scattered reports and office records. With the exception of the deductions from these figures, there is little to add regarding the later history of tea culture in these provinces beyond the general conclusion as to the ultimate success of the part which Government undertook with the able assistance of Dr. Jameson in order to bring about the complete establishment of the tea trade in North-West India. As early as 1864 Dr. Jameson was of opinion that, owing to the increase of private enterprise and the production of seed in private gardens, Government would be justified in handing over the tea plantations to private capitalists. "Government," he says, "has done its work in proving that tea can be profitably cultivated in North India. Seeds and seedlings have been distributed and skilled workmen supplied to planters in various parts of India." The extraordinary progress which occurred within a few years may be understood from the following facts :—In the year 1847, and up to 1859, tea cultivation was confined entirely to Government plantations, the total area being 166 acres. In 1859 the land under tea in Dehra Dún did not exceed 700 acres, and in Kumaon there was only one small private estate besides the Government plantations. In 1880 the area was as follows :—

	Number of gardens.	Area.		
		Acres.	Roods.	Poles.
Kumaun	33	3,342	3	10
Garhwál	10	634	3	0
Dehra Dún	20	6,960	0	0
Total ...	63	10,937	2	10

Indian teas in the Australian markets.

On the occasion of the recent International Exhibition at Melbourne the opportunity was taken of bringing to the notice of the Australian people the merits of Indian-grown teas. The undertaking was entirely successful, and the prospects of Indian tea-planters have thereby received a great impulse. They will now have a better chance of satisfying a demand for Indian tea on its own merits, and the prejudice in favour of Chinese tea which went so far as to encourage the doubtful practice of selling Indian tea as that of China will undoubtedly lose ground. The planters in Asám and Bengal will be more directly benefited by these imports to Australia. For the teas of North-West India a market closer at hand is required. Efforts are now being made to renew and extend the Indian tea trade beyond the borders of the North-Western frontier where the demand is practically unlimited. Mr. J. B. Fuller in his report on the foreign trade of the North-Western Provinces and Oudh makes the following remarks as to the advantages of opening up a trade between Kumaun and Tibet :—

> "So far as the commercial interests of these provinces are concerned, the most interesting point in the traffic they transact with Tibet is the opening it

might afford for the inferior classes of Kumaun tea, which will not bear the cost of carriage to the sea-board. At present the markets of Tibet are closed by the united influence of the Chinese Government and the Tibetan Lamas, who, having the monopoly of the wholesale and retail tea supply of the country, are naturally averse to the competition of a traffic in Indian tea, which might be more difficult to engross. The strict monopoly to which the tea trade between China and Tibet is subject is fully described in a recent report by Mr. Colbourn Baker, H. B. M.'s Consul at Chung Ching: his remarks, which specially relate to the prospects of a tea trade between Assam and Tibet, apply no less pertinently in the case of Kumaun, and the result of the system which he describes is that during the year under report not only was no tea exported to Tibet from these Provinces, but Chinese tea was actually imported into native Garhwál by the Nilang pass. 'Tea', Mr. Baker writes, 'is to the Tibetan more than a luxury: it is an absolute necessity.' Yet the Tibetans on our frontier are compelled to purchase tea of atrocious quality, the price of which has been swelled by a long and difficult transport from the eastern extremity of the country; while immediately across the frontier there are tea gardens whence they could be supplied with a better article, at a cheaper price, and with profit to the Kumaun tea-planters as well as to the itinerant traders (Bhotias) through whose hands it would pass. The price of brick tea per ℔. on the Kumaun-Tibet frontier is not known with accuracy, but since Mr. Baker shows that its price is increased from 4½ annas to 8 annas per ℔., by transport from Bathang to Lhassa, which is not one-third of the way, its price on the Kumaun frontier must be very considerable and much in excess of what Kumaun planters could supply it for. Were the trade opened therefore the Tibetans would get cheaper as well as far better tea than what they at present consume, which in the words of Mr. Baker is 'the merest refuse,' consisting of little else than the twigs and brushwood of the tea plant, and vastly inferior to the very sweepings of Indian tea godowns. The tea-planting industry of Kumaun would benefit largely by the opening out of a trade, which would enable it to dispose of its coarser produce easily and cheaply. So heavily is Kumaun tea handicapped by the expense of transport to Calcutta that the most profitable portion of the trade even now is that transacted in green teas with merchants from Central Asia who purchase the tea at the factory and carry it away themselves, saving the planters the expense and trouble of packing. Kumaun planters are well aware of the advantages which a trade with Tibet would give them, and a former manager of the Kousani Tea Company actually manufactured brick tea and endeavoured, but unsuccessfully, to get it into Tibet. Lastly, the Bhotias, in whose hands the Tibet trade lies, would derive great benefit from the substitution of a new article of commerce for borax, the price of which has fallen under American competition too low to afford substantial profits on its import."

Tea in Dehra Dún.

The great success which has attended the cultivation of tea in Dehra Dún was hardly anticipated by Dr. Royle, who appeared to be decidedly in favour of a higher elevation. The locality which he recommended as being the most suitable for experiments in this district was a place called Jarrapani half way between Rájpur and Mussoorie and about 5,000 feet above the sea. The flatness of the ground in the Dún however was probably the chief cause of its being rejected in the first instance; for it had been observed that in China the finest tea plantations were situated for the most part on sloping ground.[1] Dr. Falconer, who succeeded Dr. Royle at Sahéranpur, on finding that the tea plant would grow even at Sahéranpur, was naturally led to a different conclusion, and it was at length decided to commence operations in the Dún. The first tea plants were introduced in 1842, and two years later the Kaulagir plantation was started under the superintendence of Dr. Jameson, who is still living to witness the successful results of his energy and perseverance.

Kaulagir.

In 1847 this piece of ground covered about eight acres. The plantation was added to from time to time until over 300 acres were under cultivation. It was visited in 1850 by Mr. Fortune, who was deputed by Government to inspect the tea plantations in India and to submit a report on their condition. The result of his visit led him to condemn the Dún as altogether unsuited for the cultivation of tea. The Kaulagir plantation happened just at this time to be in an unsatisfactory condition, but for reasons depending on the mode of cultivation, and not, as time has shown, on account of any radical defect in the locality. At any rate the defects, such as they were, were soon remedied by Dr. Jameson, and the good prospects of tea cultivation in the Dún were ensured. At a lecture given by Dr. Royle at the Royal Asiatic Society a letter from Captain Cautley was read in which he gave the following description of the Dehra Dún plantations :—"I saw the Government garden near Kaulagir, in which there were 4,000 plants growing most luxuriantly, the whole in full blossom. I believe that the whole of these, with the exception of a few brought from the hill plantations, are seedlings; and certainly, as far as luxuriance of vegetation goes, I never saw anything so promising in my life. There cannot be a doubt of the tea growing luxuriantly in all this part of the Dún." Dr. Falconer was also present at this meeting and spoke strongly in favour of extending cultivation in the Dehra Dún, not only on account of the suitable climate and soil, but also because of the large amount of cleared land that was available in that locality; labour too, he maintained, was cheap as well as carriage.

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[1] Mr. Fortune was no doubt similarly influenced when criticising the condition of the plants at Kaulagir during his inspection tour in 1850.

The yield of tea and seeds from Kaulagir plantation during the years 1861 to 1865 is given below:—

		1861-62.	1862-63.	1863-64.	1864-65.	1865-66.
		lb	lb.	lb.	lb	lb.
Tea	Green ...	1,755				
	Black ...	14,982				
	Total ...	16,737	18,915¾	19,878¼	25,078	36,202
		Mds.	Mds.	Mds.	Mds	Mds.
Seeds ...		560	1,307	860	1,050	1000
Remarks ...		Outturn lessened by severe drought.		Ten acres added to plantation.	Two acres added to plantation.	

This plantation after having remained for upwards of 23 years under Government management was sold in 1867 to the Raja of Sirmor for two lacs of rupees. In 1868 the receipts amounted only to Rs. 1,401, but the garden now promises to become a valuable source of income to the purchaser. In 1866 the road over the Mohan pass was constructed and a much more direct route was thus established for the carriage of tea from the Dún.

Other gardens.

Shortly after the formation of the Government plantation several other gardens were started in the Dún, including Harbanswala and Arcadia, both now belonging to the Dehra Dún Tea Company, the largest and at the present time the most successful concern in the Dún. Many of the other gardens however failed, either from want of capital to start with, or because the managers were totally ignorant as to how the plant should be cultivated or the tea prepared. Since the year 1850 however the prospects of tea-cultivation have gone on improving and every year sees an increase in outturn and a finer quality of tea. In 1857 Dr. Jameson estimated regarding the tea-bearing capabilities of the Dún as follows: area 100,000 acres; yield 10,000,000lb; average per acre 100lb Although the additional land brought under tea cultivation is annually considerable, it seems improbable that such a large area as calculated by Dr. Jameson will ever be utilized for this purpose. On the other hand his estimate of outturn per acre was far too small, as will be seen by some detailed statements which follow. In 1863-64 only 1,700 acres were under tea cultivation.

Irrigation.

The question as to the effect of canal irrigation on tea plants seems to be finally disposed of. Fine healthy plants are now to be seen where formerly, when artificial irrigation was practised, the plants were sickly and sterile patches of soil were frequent. These patches were caused, it is supposed, by the excess of lime contained in the water; the low temperature of the water no doubt contributed to bring about the injurious conditions as described above. Artificial irrigation has therefore been altogether given up by most of the tea-planters in the Dún, and a marked improvement in the healthiness of the plants has been taken place in consequence. Other causes have also combined to bring about better results. Greater attention for instance is being given to the advantages of manuring. Firewood, an equally indispensable article, is yearly becoming more scarce, and is likely to prove a cause of anxiety for the future. Until recently a large quantity of tea used to be bought up by merchants from Kábul and Central Asia, who took it away with them in their own bags. Tea of very average quality was thus sold at from 13 annas to one rupee per tb. The trade with Kábul will in all probability be renewed now that hostilities with that country have ceased. The quality of the Dún teas as regards flavour and aroma has a close resemblance to that of the other kinds produced on the Himálaya in Kumaon and Kangra. Two varieties of the plant are cultivated, *viz.*, the China and a hybrid between it and the Asám plant, the latter being more closely related to the China than to the Asám variety. The Asám and Asám hybrid are found to be too delicate for cultivation in this part of India. There are at present twenty plantations in the Dún, making up a total area of 6,960 acres. The Dehra Dún Tea Company have lately introduced at their factories sets of rolling machinery which have proved to be a great saving of labour. The outturn of tea from the Dehra Dún Tea Company's plantations in 1879 was 313,058 tb., an average that is of 439 tb. per acre. The cost per acre amounted to Rs. 133-10-7.

APPENDIX B.

TEA STATISTICS.

Name of plantation.	1848.		1849.			1850.			1851.			1852.		1853.		1854.		1855.	
	Black.	Green.	Black.	Green.	Bohea.	Black.	Green.	Bohea.	Black.	Green.	Bohea.	Black.	Bohea.	Black.	Bohea.	Black.	Bohea.	Black.	Bohea.
	℔.	℔.	℔.	℔.	℔.	℔.	℔.	℔.	℔.	℔.	℔.	℔.	℔.	℔.	℔.	℔.	℔.	℔.	℔.
Kaulagir ...	37	32	167	114	44	58	385	247	219	107	132	1,103	178	3,583	534	6,388	874	9,882	2,681

In 1856, the production of black tea at Kaulagir reached 9,596 ℔. of green tea, 1,653 ℔. and of bohea, 4,774 ℔. In 1857 the outturn was 4,501 ℔. of black tea, 896 ℔. of green tea and 922 ℔. of bohea. The Páori garden yielded 2,251 ℔. of black tea in 1853, 707 ℔. in 1855, 1,844 ℔. in 1856, only 32 ℔. in 1857, 9,492 ℔. in 1859-60, 10,247 ℔. in 1860-61 and 12,964 ℔. in 1861-62. The returns from Háwalbágh are nominal up to 1859-60. The Bhim Tál plantation yielded 1,476 ℔. in 1859-60, 1,[illegible]70 ℔. in 1860-61, 2,576 ℔. in 1861-62, 2,251 ℔. in 1862-63, 4,948 ℔. in 1863-64 and 9,720 ℔. in 1864-65. The remaining figures are as follows —

Name of plantation.	1859-60.		1860-61.		1861-62.	1862-63.	1863-64.	1864-65.	1865-66.	1866-67.	1867-68.	1868-69.	1869-70.	1870-71.
	Black.	Green.	Black.	Green.										
	lb.	lb.	lb.	lb.	lb.	lb	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Háwalbágh	2,277	5,229	5,660	1,401	6,067	6,242	7,977	8,131	18,291	15,174	11,473	12,855	4,961	5,231
Ayár Toli,	1,984	...	7,960	...	7,104	8,476	8,780	11,598	11,940	12,022	10,115	10,502	3,984	147
Kaulagir...	19,051	3,768	[a]14,982	[*]1,755	13,752	518,916	19,879	25,078	36,202	...	...	...	...	...

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[a] The decrease in yield was owing to drought during the cold season and in April and May. There was, however, an abundant supply of seed this year, *viz.*, 2,220 maunds, which was nevertheless unequal to meet the demand. Of the manufactured this year 16,000 lb. were sent to England and the rest was sold by auction.

† The dry weather during April and May affected all the plantations in North-Western India; hence the decrease in yield this year.

Receipts and Expenditure of the Government plantations, 1862-1869.

	1862-63.	1863-64.	1864-65.	1865-66.	1867 68.	1868-69.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Receipts ...	*1,11,006	1,04,387	...	82,180	7,275	...
Expenditure,	. 65,000	64,300	59,199	58,000	26,000	14,507
Balance ...	46,006	40,087	...	24,180	...	...

* This does not include credit for 700,000 plants distributed gratis; also seeds for which Rs. 14,060 might have been realized by selling to planters in Kangra. The records are too imperfect to give the full details for each year.

Actual outturn of tea from plantations of Kumaon, Dehra Dún, and Kangra Valley for the last ten years:—

1871	... 619,072 lb.	1876	... 1,535,900 lb.		
1872	... 741,769 „	1877	... 1,398,785 „		
1873	... 981,854 „	1878	... 1,632,054 „		
1874	... 1,217,975 „	1879	... 1,800,000 „	uncertain.	
1875	... 1,289,532 „	1880	... 1,945,181 „		
Estimated crop for 1881 ...		...	... 1,868,900 „		

DISTRIBUTION OF TEA SEEDS.

From the Kumaon, Garhwál and Dehra Dún Nurseries, 1860-67.

1860-61.	1861-62.	1862-63.	1863-64.	1864-65.	1865-66.	1866-67.
Mds srs.	Mds. srs.	Mds. srs.	Mds. srs.	Mds. srs.	Mds. srs.	Mds. srs.
2,220 0	No record found.	2,859 32	2,361 0	2,842 0	2,103 0	1,643 0

The records for 1861-62 are not procurable.

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APPENDIX A. 1.

Table of rates according to which farmers of the forest dues in Kumaon were authorised to collect in 1847.

	A.	p.		A.	p.
Each cart-load of wood ...	6	0	Each cart-load of burnt lime ...	12	0
" " of *sál* logs (*lattas*) ...	8	0	" " kunkur ...	6	0
" wooden sugar-mill ...	8	0	" pony-load of lime ...	0	6
" cart-load of rafters (*karis*),	8	0	" ass-load ditto ...	0	3
" " of ebony ...	4	0	" pony-load of lac ...	4	0
" " of bambus ...	6	0	" head-load of ditto ...	2	0
" pony-load of ditto ...	0	6	" pony-load of *pípalmor* ...	4	0
" head-load of ditto ...	0	3	" head-load of ditto ...	2	0
" bhangy-load of ditto ...	1	0	" cart-load of charcoal ...	4	0
" cart-load of *bhábar* grass...	6	0	" bhangy-load of baskets ...	1	0
" pony-load ditto ...	0	6	" ditto of wooden utensils,	1	0
" head-load ditto ...	0	3	" head-load of ditto ...	0	6
" cart-load of *tát* reeds ...	6	0	" pony-load of *ruina* ...	4	0
" pony-load of ditto ...	0	6	" head-load of ditto ...	2	0
" head-load of ditto ...	0	3	*Catechu furnaces.*		
" cart-load of grass ...	6	0		Rs	a
" " of *múnj* ...	4	0	One in Kota	7	8
" bullock-load ditto ...	0	6	" " Chaubhainsi... ...	4	0
" head-load ditto ...	0	3	" " Tallades	2	8
" *gún* of catechu ...	8	0	" " Chhakhita	5	8

The grazing dues were three annas for each buffalo and one anna for each cow or bullock pasturing in the Bhábar during the year, with the following exemptions:—Calves of all kinds up to two years of age, all cattle actually employed in carriage, all cattle *boná fide* the property of a hill head-man possessing a lease, all cattle passing through and not staying more than five days, all cattle belonging to the head-men of the Bhábar villages, and all belonging to cultivators actually residing in the Bhábar all the year round.

APPENDIX A. 2.

The following table shows the duties which the farmers were permitted to levy by Mr. Shore[1] in Dehra Dún in 1826:—

Table of duties levied in the Dún forests in 1826.

Article.	Per 4 bullock cart = 20 maunds.			Per 3 bullock cart = 15 maunds.			Per 2 bullock cart = 10 maunds.			Mule or buffalo = 4 maunds.			Bullock or pony = 3 maunds.		Ass-load = 1½ maunds.		Head-load = ½ maund.	
	Rs.	a.	p.	Rs.	a.	p.	Rs.	a.	p.	Rs.	a.	p.	A.	p.	A.	p.	A.	p.
Sisu, *tún* and ebony of any size.	5	0	0	3	12	0	2	6	0	1	0	0	12	0	6	0	3	0
Each wooden sugar-mill,	0	12	0	0	12	0	0	12	0	...			...		...		...	
Bambus ...	0	6	0	0	4	6	0	3	0	0	1	0	0	9	0	6	0	3
Beam for sugar-mill ...	1	0	0	0	12	0	0	8	0	0	3	0	2	0	1	0	0	6
Sál of any size ...	0	8	0	0	6	0	0	4	0	0	1	6	1	0	0	6	0	3
Fire-wood and timber not expressly specified.	0	6	0	0	4	6	0	3	0	0	1	0	0	9	0	6	0	3
Bábar and *múnj* grass	0	8	6	0	6	0	0	4	0	0	1	6	1	0	0	6	0	3
Ringáls for hukka stems,	3	0	0	2	4	0	1	8	0	0	10	0	7	6	4	0	2	0
Nal reed for matting ..	1	4	0	0	15	0	0	10	0	0	4	0	3	0	1	6	0	9
Khat or catechu ...	5	10	0	4	3	0	2	13	0	1	2	0	14	0	7	0	3	6
Lac	1	12	0	1	5	0	0	14	0	0	5	6	4	0	2	0	1	0
Lime	0	4	0	0	3	0	0	2	0	0	0	9	0	6	0	3	0	2
Charcoal	0	8	0	0	6	0	0	4	0	0	1	6	1	0	0	6	0	3

APPENDIX A. 3.

REVENUE OF EACH FOREST DIVISION.

Year.	Kumaon.	Naini Tál.	Ráni-khet.	Garh-wál.	Dehra Dún.	Bhagi-rathi.	Jaunsár Báwar.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1865-66 ...	2,59,544	...	...	2,48,305	40,431	...	...
1866-67 ...	1,63,369	...	...	2,28,357	43,729	...	...
1867-68 ...	1,78,459	...	..	1,77,359	41,156	...	...
1868-69 ...	1,72,601	...	...	1,68,733	40,333	...	...
1869-70 ...	2,55,333	...	...	1,48,972	84,252	4,508	...
1870-71 ...	1,05,601	...	...	1,11,745	31,943	15,451	36,589
1871-72 ...	1,10,152	..	1,295	1,30,380	96,819	5,36,924	1,28,891
1872-73 ...	2,67,339	1,016	1,981	2,08,700	90,233	6,94,013	3,23,834
1873-74 ...	3,65,687	1,346	3,292	1,53,795	78,270	4,66,591	5,12,336
1874-75 ...	2,76,372	1,729	6,000	1,16,948	81 805	2,84,376	2,62,017
1875-76 ...	2,97,334	5,121	15,697	2,00,946	67,521	1,00,480	2,22,247
1876-77. ...	2,18,166	18,010	11,885	1,40,322	67,033	87,964	2,03,628
1877-78 ...	1,79,364	15,285	12,073	1,73,348	77,221	1,21,129	2,07,098
1878-79 ...	1,70,856	17,155	53,364	1,31,875	48,490	1,02,822	2,62,436
1879-80 ...	1,65,574	21,426	7,165	1,11,794	41,482	50,970	2,14,456

Note.—In 1879-80 the Tons division was separated from Jaunsár-Báwar, and for that year the adjusted accounts show Rs. 43,875 for Jaunsár-Báwar and Rs. 1,70,581 for the Tons division.

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[1] Mr. Shore to Commissioner, Kumaon, 15th September, 1826.

APPENDIX A 4.

EXPENDITURE OF EACH FOREST DIVISION.

A—Conservancy and Working · *B.—Establishment.*

Year.	Kumaun.		Naini Tál.		Ránikhet.		Garhwál.		Dehra Dún.		Bhagirathi.		Jaunsár-Báwar.	
	A.	B.	A.	B.	A.	B.	A.	B.	A.	B.	A.	B.	A.	B.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1865-66 ..	61,801		...	...	...	...	81,717	11,641	25,639	28,780	...	...	...	...
1866-67...	86,024	28,431	...	...	...	...	95,265	10,156	23,429	28,988	...	...	...	...
1867-68 ..	83,067	26,613	...	...	...	...	40,433	12,055	11,976	22,629	...	...	...	...
1868-69...	49,481	18,172	...	...	...	...	54,104	19,566	22,111	23,980	...	...	...	...
1869-70...	47,574	26,644	...	...	...	...	58,720	12,241	25,571	24,937	77,242	13,008	...	...
1870-71 .	1,03,198	26,138	...	...	...	...	46,694	11,462	23,104	22,459	2,18,893	12,544	1,53,725	
1871-72...	54,867	21,114	...	...	4,034	3,070	48,098	14,946	39,054	19,321	3,49,030	18,436	2,57,800	
1872-73 ..	69,755	21,606	476	731	3,224	6,509	43,540	18,023	22,590	23,695	4,12,035	13,393	3.37,766	
1873-74...	54,974	25,414	678	807	2,569	7,459	57,787	17,479	28,326	20,805	4,10,643	13,439	2,47,668	23,873
1874-75...	57,641	25,389	348	710	2,029	10,751	45,016	16,173	25,451	22,504	3,80,079	14,307	1,76,170	16,741
1875-76...	80.599	26,833	1,602	1,298	4,351	11,321	64,677	20,515	10,786	14,685	69,940	14.660	1.44,664	22,952
1876-77...	66,754	17,144	6,329	2,164	7,301	8,661	63,625	20,157	19,108	19,086	1,29,862	13,357	1,97,491	19,179
1877-78...	54,055	21,150	7,233	2,415	5,277	13,053	37,970	19,480	21,189	28,431	48,397	9.011	2.00,637	20,827
1878-79 ..	47,534	23,328	5,743	2,549	22,812	12,991	34.880	21,669	15,420	23.513	82,176	4.658	1,89,252	27,166
1879-80...	50,036	23,613	19,125	1,880	6,457	10,900	44,051	24,204	9,855	18,703	14,312	7,148	1,16,400	24,374

Note.—In 1879-80 the Tons division was separated from Jaunsár-Báwar, and of the expenditure recorded against the former Rs. 68,318 (Rs. 66,282 A. and Rs. 2,036 B.) belongs to the latter.

APPENDIX A.5.

Schedule of tolls on the export of minor forest produce in the Kumaun forest division.

No.	English and botanical or vernacular names.	Loaded in carts.		Loaded animals.							Average annual export.
		Royalty per ox.	Royalty per buffalo.	Per camel.	Per buffalo.	Per ox	Per pony.	Per donkey	Per banghy.	Per head-load.	
		Rs. a. p.	Rs. a p.	Rs. a. p	Re. a. a	Rs. a. p.	Re. a. p.	Re. a. p	Re. a. p.	Re. a. pi	
1	Grass and reeds	0 6 0	0 8 0	0 5 0	0 2 6	0 2 0	0 2 0	0 1 6	0 1 3	0 0 9	24,500 loads
2	Typha elephantina	0 4 0	0 5 0	...	0 1 0	0 0 9	0 0 9	0 0 6	0 0 6	0 0 3	20 ,,
3	Ditto thin and palm leaves ..	0 5 0	0 6 0	...	0 1 6	0 1 0	0 1 0	0 0 9	0 0 3	0 0 6	...
4	Grass for thatching	0 2 0	0 3 0	0 1 6	0 1 0	0 0 9	0 0 9	0 0 6	0 0 6	0 0 3	8,000 ,,
5	Reeds	0 2 6	0 3 0	...	0 1 3	0 1 0	0 1 0	0 0 9	0 0 9	0 0 6	1,029 ,,
6	Grass and bambu leaves ..	0 1 6	0 2 0	0 0 9	0 0 9	0 0 9	0 0 9	0 6 0	0 0 6	0 0 3	17 ,,
7	Wooden tubes (*bánsi*) ...	0 12 0	1 0 0	...	0 6 0	0 4 0	0 4 0	0 3 0	0 2 0	0 1 0	...
8	Firewood (*sukhta*)	0 2 3	0 3 0	0 1 6	0 1 0	0 0 9	0 0 9	0 0 6	0 0 6	0 0 3	33,500 ,,
9	Charcoal (*koila*)	0 12 0	1 0 0	...	0 5 0	0 3 0	0 3 0	0 2 0	0 1 6	0 1 0	27,500 mds.
10	Limestone	0 6 0	0 8 0	0 4 0	0 4 0	0 3 0	0 3 0	0 1 6	0 1 6	0 1 0	52,000 loads
11	Burnt lime	1 0 0	1 4 0	1 0 0	0 8 0	0 5 0	0 5 0	0 3 0	0 2 6	0 1 3	
12	Bark of the Zizyphus ...	0 4 0	0 6 0	0 2 0	0 2 0	0 2 0	0 2 0	0 2 0	0 2 0	0 1 0	...
13	Circle of sieve	2 0 0	2 8 0	...	0 8 0	0 6 0	0 6 0	0 4 0	0 4 0	0 3 0	...
14	Hemp (*bhang*)	0 6 0	0 8 0	0 4 0	0 4 0	0 4 0	0 4 0	0 2 0	0 1 6	0 1 0	170 mds.
15	Cane (*bet*)	0 12 0	1 0 0	...	0 5 0	0 3 0	0 3 0	0 2 6	0 2 0	0 1 6	48 loads.
16	Chalk or pipe clay (*khaira matti*),	0 3 0	0 4 0	..	0 1 0	0 0 9	0 0 9	0 0 6	0 0 6	0 0 3	180 ,,
17	Horns of cows and buffaloes ...	0 8 0	0 10 0	0 4 0	0 4 0	0 4 0	0 4 0	0 4 0	0 3 0	0 2 0	7,000 ps.

No.	English and botanical or vernacular names.	Measurement.	Royalty.				Average annual export.
				Rs.	a	p.	
18	Acacia Catechu (*churan*)	Length up to 16′ girth to 30″.	Per score	14	0	0	Scores. 2,000
19	Do. (*múmla*) ...	„ 5′ „ 80″ ...	„	6	4	0	
20	Do. (*balli*) ...	Length as it may be 12″	„	4	1	0	
21	Do. (*músal*) ...	Length up to 8′ girth 8″.	Per each	0	3	0	
22	Do. (parts of carts)	„ 14′ 8″ ...	„	0	1	0	
23	Do (ditto) ...	„ 6′ 10″ ..	„	0	1	0	
24	Large bedsteads made of sál, sisu, sandan.	Girth of legs, heads above 17″	„	0	12	0	Pieces. 4,800
25	Do. of other woods	Ditto ...	„	0	6	0	
26	Do. as 24 ...	Girth of legs, heads up to 16″	„	0	8	0	
27	Do. as 25 ..	Ditto ..	„	0	3	0	
28	Legs of bedsteads as 24.	Girth of heads above 17″	„	0	2	0	
29	Do. as 25 ...	Ditto ...	„	0	0	9	
30	Do. as 24 ...	Girth of head up to 16″	„	0	1	0	
31	Do. as 25 ...	Ditto ...	„	0	0	6	
32	Small bedsteads as 24.	Length up to 7′ girth to 10″	„	0	1	6	
33	Do. as 25 ...	Ditto ...	„	0	0	9	
34	Do. as 24 ...	Length up to 4′ girth to 10″	„	0	0	9	
35	Do as 25 ...	Ditto ...	„	0	0	6	
36	Boxes as 24 ...	Length up to 3′ girth above 60″	„	1	4	0	
37	Do. as 25 ...	Ditto ...	„	0	10	0	
38	Do. as 24 ...	„ girth 31″ to 60″	„	0	10	0	
39	Do. as 25 ...	Ditto ...	„	0	6	0	
40	Do. as 24 ...	„ girth up to 30″	„	0	4	0	
41	Do. as 25 ...	Ditto ...	„	0	2	0	
42	Bambus *saraincha bahgu*.	...	Per 100 scores.	12	0	0	37,800 scores.
43	*Kanderu* ...	...	„	9	0	0	96,000 „
44	*Chhaneju* and *chhari*.	...	„	7	0	0	190,000 „
45	*Paina* ...	...	„	4	0	0	23,000 „
46	*Balli*	Long up to 24 feet	Each	0	0	6	3,000 „
47	*Doli*	„ 25′ or over.	„	0	1	0	2,000 „
48	*Bhábari* ...	...	Per 100 scores.	14	0	0	with 44.
49	*Chiralund* for utensils.	...	Per head-load.	0	4	0	...
50	Large bambu box,	...	Each	0	1	0	Pieces. 16,000
51	Small ditto and basket.	...	„	0	0	6	
52	Ditto basket ...	...	„	0	0	3	
53	Sticks and fishing rods.	...	„	0	0	2	13,000

No.	English and botanical or vernacular names.	Royalty.				Average annual export.
			Rs.	a	p.	
54	Scale plates	Each	0	0	1	4,000
55	Matting (*chatái*)	Per yard	0	0	3	3,400
56	Box made of cane, large ...	Each	0	1	0	...
57	Do, small	„	0	0	9	...
58	Skin of Bárasingha	„	0	8	0	Pieces 86,000
59	Do. cow, buffalo, camel, large ...	„	0	4	0	
60	Do. do. deer, middling ...	„	0	2	0	
61	Do. do., small	„	0	1	0	
62	Do. sheep and goats	„	0	0	6	
63	Shoes	„	0	0	6	
64	Horns of stag, deer, &c.... ...	„	0	0	6	In 17.
65	Footstools (*mora*)	„	0	1	0	
66	Ropes of *máljan* and *boddla* ...	„	0	0	3	
67	Each gold-washing sieve ...	„	5	0	0	
68	Cart wheels, large	„	1	12	0	
69	Ditto, small, ...	„	1	4	0	
70	Parts of carts	„	0	4	0	
71	Stools (*pira*)	„	0	1	6	...
72	Wooden platters and pots, large ...	„	0	1	0	45,600 pieces.
73	Ditto, small ...	„	0	0	9	
74	Ditto, large of *B. malabaricum*,	„	0	0	9	
75	Ditto, middle ...	„	0	0	6	
76	Ditto, small ...	„	0	0	3	
77	Wooden shoes	„	0	0	3	...
78	Scalá beams, spoons, and sieves ...	„	0	0	1	...
79	Nigali (*dewat* and *takhti*) ...	„	0	0	3	...
80	Spinning wheels	„	0	2	0	...
81	Drums	„	0	1	6	...
82	Native musical instruments (*dutara*),	„	0	0	3	...
83	Gun stocks	„	0	0	6	...
84	Various seeds dry and gums ...	Per seer	0	0	3	650 maunds.
85	Ditto green ...	„	0	0	1	460 „
86	Ditto do. and resins,	„	0	0	9	150 „
87	Ditto roots and fibres ...	„	0	0	6	400 „
88	Bark of the pomegranate ...	„	0	4	0	6,800 „
89	Powder of *Mallotus phillipinensis* ...	„	0	2	0	175 „
90	Various drugs	„	0	1	6	170 „
91	*Piper longum*	„	0	2	6	550 „
92	Piper *Rubia, cordifolia*, honey, &c. ...	„	0	1	0	900 „
93	Bánslochan	„	1	10	0	5 „
94	Lac	„	0	1	3	713 „
95	Catechu	Per maund	9	0	0	3,000 „
96	Seeds of *Prinsepia utilis* (*titúwa*) ...	„	1	4	0	5 „
97	Dried root of *Datisca cannabina* ...	„		0	0	4 „
98	*Myrica sapida*, khas-khas, and gum...	„	0	8	0	1,800 „
99	*Cinnamomum Tamala*, &c. ...	„	0	4	0	848 „
100	*Woodfordia floribunda, &c.* ...	„	0	4	0	2,200 „
101	Drugs of sorts	„	0	4	0	100 „
102	*Ritha* &c., ...	„	0	4	0	500 „
103	Drugs of sorts	„	0	2	0	100 „
104	Ditto	„	0	3	0	150 „
105	Bark of *Cinnamomum Tamala* ...	„	0	12	0	616 „
106	Drugs of sorts	„	0	6	0	80 „
107	String and rope of *múnj* and *bábar* ...	„	0	8	4	75 „
108	Wax	„	10	0	0	173 „
109	Resin of *Pinus longifolia* (*birja*) ...	„	1	4	0	86 „
110	Ditto *bákhar-birja* ...	„	0	8	6	50 „
111	Rhubarb (*dolu*)	„	0	12	0	11 „
112	*Acorus calamus* (*bach*)	„	0	4	0	646 „

NOTES ON THE ABOVE LIST.

1. Includes—

(*a*)—*Bábar*, the grass of *E. comosum*, *S. angustifolius*, and others referred to at p. 808.

(*b*)—*Bínd*, the leaves of *S. munja*, used for thatching.

(*c*)—*Bindu*, the leaves of other reeds used for the same purpose.

(*d*)—*Múnj* and *sirki*, parts of *S. munja*.

(*e*)—*Tát*, the culms of *S. fuscum* and *C. laniger*.

(*f*)—*Sínk*, the culms of *Anatherium muricatum*.

3. Includes small reeds of the *patera* (*T. Elephantina*), the reeds of the *motha* (*Cyperus tegetiformis*) and the leaves of the *khajúr* (*Phœnix sylvestris*).

5. Includes the reeds of the *nal-tura* (*Phragmites nepalensis*).

6. Includes the leaves of the *sirálu* (*Andropogon species*) and bambu used for fodder.

43. See page 810.

67. These are ropes made from the *máljan* (*Bauhinia Vahlii*), page 793, and *boddla* (*Sterculia colorata*), page 792.

68. A royalty is levied on each sieve or rocker used by the gold-washers.

85. Under this head comes the following:—

Dry *aonla*, the fruit of *P. Emblica* known as Emblic myrobalans, page 777.

Dry *haraira*, the fruit of *T. Chebula* known as Chebulic myrobalans, page 779.

Mocharas, the gum of the *Bombax malabaricum* (page 784) and *Moringa pterygosperma* (page 784), *Mochkand*, the root of *Eclipta erecta*, page 735.

Roli-ki-dána, the seeds of *Mallotus phillipinensis* (page 776).

86. Under this head we have the green fruit of the *aonla* and *haraira*.

Dry *bahera*, the fruit of *T. belerica*, known as Beleric myrobalans, page 777.

Amaltás, the pods of *Cassia fistula*, page 779.

Túlsi, the leaves of *Ocimum sanctum*, and the flowers of the *dhák* or *Butea frondosa*, page 778.

87. Under this come:—

The resin of the *sál* (page 785) and the galls of *Pistacia integerrima* known as *kakrasíngi*, page 746.

88. Under this head are included the following fruits, roots and fibres:—

Green *pípla*, the fruit of *Piper silvaticum*, page 705.

Kála-jíra, the fruit of *Carum Carui*, page 705.

Bildi-kand, the tubers of *Pueraria tuberosa*, page 748.

The fibre of the pods of the cotton-tree, *Bombax malabaricum*, page 791.

91. Under this head we have the following:—

Kadúi.

Kútki, plants of the genus *Ophelia* used for bitters, page 744-46.

Bálchar, root of *Nardostachys Jatamansi*, page 743.

93. Under this head the following are included:—

Píplamor, the *Piper silvaticum*, page 705.

Manjít-ka-jar, root of *Rubia cordifolia*, page 773.

Ratti, seeds of *Abrus precatorius*, page 724, and *sahat*, honey.

94. Is the silicious secretion from the joints of the bambu, also known. as *tabashír*.

98. See page 742.

99. See pages 705.

100. See page 705 for *C. Tamala*. This head also includes :—

Roots of various kinds exported as *kand* and *Kinjora-ki-jar*, the roots of the different species of *Berberis*, page 728.

The seeds of *Pharbitis Nil* (*kála-dána*), page 745 ; and the roots of *Hedychium spicatum* (*kapúr-kachri*), page 738.

101. This head includes the following :—

Dhái-ke-phúl, the flowers of *Woodfordia floribunda*, page 778, *Chhalaru* oak-bark. *Pakhán-bed*, the root of *Saxifraga ligulata*, page 749. *Nisot*, the root of *Ipomœa turpethum*, and the bark of *Symplocos cratægioides* (*lodh*), page 776.

102. Under this head come the following :—

Túng, the bark of *Rhus Cotinus*, flowers and bark of *Cedrela Toona*, page 778. *Nagarmotha*, roots of *Cyperus juncifolius*, page 774. *Pit pápra*, seeds and leaves of *Fumaria parviflora*, page 737, fruit of *Elæagnus umbellata*, page 736, and seeds of *A. Catechu*.

103. Includes *Ritha*, the seeds of *Sapindus detergens*, page 749 ; *Selkhari*, a white clay and *manjít*.

104. Comprises *giloi*, the roots of *Tinospora cordifolia*, page 752, medicinal herbs of sorts and *phindaru* (*Colocasia himalensis ?*)

105. Includes various mineral drugs.

107. Includes *Rhus vernicifera*, page 785, and *makoi*.

APPENDIX A.6.

List of rates for the sale of timber at Rámnagar and Moradabad Government Forest Depots.

Name of timber.	Measurement	Class.	Rate per cubic foot at	
			Rámnagar.	Moradabad.
			Rs. a. p.	Rs. a. p.
Sál karis	12′ × 5″ × 1″	I	1 5 0	1 8 0
Ditto	Ditto ...	II	0 15 6	1 2 0
Ditto	Ditto ...	III	0 6 0	...
Ditto	10 × 5 × 4	I	1 5 0	1 7 0
Ditto	Ditto ...	II	0 15 6	...
Ditto	Ditto ...	III	0 6 0	...
Ditto	13 × 6 × 5	I	1 6 0	...
Ditto	Ditto ...	II	1 0 0	...
Ditto	8 × 4 × 4	II	0 15 6	...

List of rates for the sale of timber at Rámnagar and Moradabad Government Forest Depots— (concluded).

Name of timber.	Measurement.	Class.	Rate per cubic foot at Rámnagar.	Rate per cubic foot at Moradabad.
			Rs. a. p.	Rs. a. p.
Sál karis.	8×4×4	III	0 6 0	...
Ditto	6×4×4	II	0 14 0	...
Ditto	Ditto ..	III	0 4 0	...
Jáman karis	10×5×4	II	0 4 0	...
Ditto	Ditto ...	III	0 2 0	...
Haldu karis	12×5×4	I	0 6 0	...
Ditto	Ditto ...	II	0 4 0	...
Chír karis	Ditto ...	I	0 8 0	...
Ditto	Ditto ...	II	0 6 0	...
Ditto	10×5×4	I	0 8 0	...
Ditto	Ditto ...	II	0 6 0	...
Sál sleeper	10′ × 32″	...	0 8 0	...
Sál karis	15×5×4	II	...	1 6 0
Sál logs squared with axe if purchased unselected from one end of the line five logs or over.	...	...	1 10 0	...
Ditto ditto selected ...	...	...	1 14 0	...
Ditto round, class I., if purchased unselected from one end of the line 10 logs or over.	...	...	1 8 0	1 14 0
Ditto ditto selected ...	...	...	1 12 0	2 0 0
Ditto round mixed class if purchased unselected from one end of the line 10 logs or over.	...	...	1 6 0	...
Ditto ditto selected ...	...	...	1 12 0	...
Ditto round, class II., if purchased unselected from one end of the line 10 logs or over.	...	...	1 4 0	...
Ditto ditto selected ...	...	...	1 12 0	...
Sál kolhus selected	...	...	1 10 0	2 0 0

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GENERAL.

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